C/CV-series
CVM1-PRO01 Teaching Box
(For Position Control Units)

Operation Manual

Produced June 1997

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to the product.

⚠ **DANGER**   Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

⚠ **WARNING**   Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

⚠ **Caution**   Indicates information that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

OMRON Product References

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note   Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3...   1.   Indicates lists of one sort or another, such as procedures, checklists, etc.

About this Manual:

This manual describes the installation and operation of the CVM1-PRO01 Teaching Box and includes the sections described below. The CVM1-PRO01 Teaching Box is a Peripheral Device for C/CV-series PCs and is used with the CV500-MC221, CV500-MC421 and C200H-MC221 Motion Control Units. It is also used with C500-NC222-E and 3G2A5-NC111-EV1 Position Control Units.

Please read this manual carefully along with the operation manuals for the CV500-MC221, CV500-MC421 and C200H-MC221 Motion Control Units, and the C500-NC222-E and 3G2A5-NC111-EV1 Position Control Units and be sure you understand the information provided before attempting to install and operate the Teaching Box.

There are six manuals, excluding this one, used with the CV500-MC221, CV500-MC421 and C200H-MC221 Motion Control Units (MC Units). These manuals are listed in the following table. The suffixes have been left off of the catalog numbers. Be sure you are using the most recent version for your area.

Name	Content	Cat. No.
CV500-MC221/MC421 Motion Control Unit Operation Manual: Introduction	Describes the features, applications, and basic operation of the Motion Control Units. Read this manual first before using a Motion Control Unit.	W254
CV500-MC221/MC421 Motion Control Unit Operation Manual: Details	Describes the operation of the Motion Control Units in detail. Read the *Operation Manual: Introduction*, above, before attempting to read this manual.	W255
CVM1-PRS71 Teaching Box Operation Manual	Describes the operation of the Teaching Box connected to a Motion Control Unit.	W257
CV500-ZN3PC1 MC Support Software Operation Manual	Describes creating control programs and setting operating parameters for MC Units using the MC Support Software.	W256
C200H-MC221 Motion Control Unit Operation Manual: Introduction	Describes the features, applications, and basic operation of the Motion Control Units. Read this manual first before using a Motion Control Unit.	W314
C200H-MC221 Motion Control Unit Operation Manual: Details	Describes operation of the Motion Control Units in detail. Read the *Operation Manual: Introduction*, above, before attempting to read this manual.	W315

There are also two manuals used with the C500-NC222-E and 3G2A5-NC111-EV1 Position Control Units (PCUs.) These manuals are listed in the following table. The suffixes have been left off of the catalog numbers. Be sure you are using the most recent version for your area.

Name	Content	Cat. No.
C500-NC222-E Two-axis Position Control Unit Operation Manual	Describes the specifications and procedures necessary to install and operate the Position Control Unit. It also describes data layouts and examples for communication between the PC and NC-222-E module.	W231
3G2A5-NC111-EV1 Position Control Unit Operation Manual	Describes the specifications and procedures necessary to install and operate the Position Control Unit.	W142

⚠**WARNING** Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

Section 1 provides an outline of the Teaching Box, including features, applications, system configuration, a list of Teaching Box functions, and a list of key functions.

Section 2 explains the operating principles, ways of delivering instructions, C500-NC222-E Position Control Unit modes, and the operations that can be performed using the Teaching Box.

Section 3 describes the procedures for connecting the Teaching Box, installing it in a control panel, and changing displays.

Section 4 contains information on the basic operations necessary for operating the Teaching Box. Be sure to read this section to fully understand the basic operations before reading detailed descriptions of each function given in subsequent sections.

Section 5 explains the operations involved in reading, writing, inserting, and deleting PCU data for C500-NC222-E Position Control Units.

Section 6 shows how to operate the C500-NC222-E Position Control Unit from the Teaching Box.

Section 7 explains the operations involved in reading and writing parameters, speeds, and positioning actions for 3G2A5-NC111-EV1 Position Control Units, and explains how to insert and delete positioning actions.

Section 8 shows how to operate the 3G2A5-NC111-EV1 Position Control Unit from the Teaching Box.

Appendix A provides a list of standard models.

Appendix B provides tables showing the error code displays, causes of errors, and possible remedies. Refer to this appendix when an error occurs. "PC" stands for "Programmable Controller" and "PCU" stands for "Position Control Unit."

Appendix C provides specifications and external dimensions.

Appendix D provides coding sheets for the C500-NC222-E.

Appendix E provides coding sheets for the 3G2A5-NC111-EV1.

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PRECAUTIONS

This section provides general precautions for using the Programmable Controller (PC) and related devices.

The information contained in this section is important for the safe and reliable application of the PC. You must read this section and understand the information contained before attempting to set up or operate a PC system.

1   Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

• Personnel in charge of installing FA systems.

• Personnel in charge of designing FA systems.

• Personnel in charge of managing FA systems and facilities.

2   General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating OMRON PCs. Be sure to read this manual before attempting to use the software and keep this manual close at hand for reference during operation.

3   Operating Environment Precautions

Install the Teaching Box properly as specified in this manual.

Do not install the Teaching Box in any of the following locations.

• Locations subject to temperatures or humidity outside the range specified in the specifications.

• Locations subject to condensation as the result of severe changes in temperature.

• Locations subject to corrosive or flammable gases.

• Locations subject to dust (especially iron dust) or salts.

• Locations subject to shock or vibration.

• Locations subject to direct sunlight.

• Locations subject to exposure to water, oil, or chemicals.

• Take appropriate and sufficient countermeasures when installing the Teaching Box in the following locations.

     • Locations subject to static electricity or other forms of noise.

     • Locations subject to strong electromagnetic fields.

     • Locations subject to possible exposure to radioactivity.

     • Locations close to power supplies.

4   Application Precautions

Observe the following precautions when using MC Unit, PCU, Teaching Box, or PC.

⚠️ **WARNING**   Do not attempt to take the Unit apart and do not touch any internal parts while the power is being supplied. Doing either of these may result in electrical shock.

⚠️ **WARNING**   Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing either of these may result in electrical shock.

⚠️ **Caution**   The following precautions are necessary to ensure the general safety of the system. Always heed these precautions.

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- The interlock circuits, limit circuits, and similar safety measures must be provided by the customer for external circuits (i.e., not in the Programmable Controller).
- Always use the power supply voltage specified in this manual.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied, particularly in places where the power supply is unstable.
- Install an external breaker and take other safety measures against short-circuiting in external wiring.
- Disconnect the functional ground terminal when performing withstand voltage tests.
- Always connect to a class-3 ground (to 100 Ω or less) when installing the Units.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place.
- Always turn off the power supply before mounting or dismounting Memory Cassettes.
- Mount the Units after confirming that the connectors are properly connected.
- Be sure to confirm that no adverse effect will occur in the equipment before executing Jog, Origin Search, Error Resetting, or Deceleration Stop.
- Be sure to confirm that no adverse effect will occur in the equipment before changing the present value.
- Be sure to confirm that no adverse effect will occur in the equipment before changing the set value.
- Be sure to confirm that no adverse effect will occur in the equipment before executing the forced set/reset.
- Be sure to confirm that set parameters operate properly.
- Do not attempt to disassemble, repair, or modify any Units.
- Do not damage, pull on, apply excessive stresses to, place heavy objects on, or pinch the cables.
- Do not pull on cables when transporting the Units.
- Double-check all the wiring before turning on the power supply.

SECTION 1
Introduction

This section provides an outline of the Teaching Box, including features, applications, system configuration, a list of Teaching Box functions, and a list of key functions.

If using the Teaching Box for the first time, be sure to familiarize yourself with this section before attempting to operate the Teaching Box.

1-1 Features and Applications

Features

The CVM1-PR001 Teaching Box has the following features.

Compatibility

The Teaching Box can be used with MC Units, Position Control Units, and Position Drivers. Either an MC Unit or a Position Control Unit can be connected, depending on the type of Position Control Unit that is selected. In this section, operations are explained in the context of connection to a Position Control Unit.

Detailed Displays

The status of all axes (two axes when the C500-NC222-E is connected and one axis when the 3G2A5-NC111-EV1 is connected) can be seen at a glance from the message displays (16 characters x 2 lines).

Interactive Operation

Interactive operation allows even those who use the Teaching Box for the first time to use it with ease through key inputs from menus.

Error Messages

Error messages are displayed when errors occur in the Position Control Unit or in the servo driver. These error messages help minimize the scale of problems caused by the error.

Applications

The Teaching Box is mainly used for the following purposes.

• Wiring check

• Monitoring operation via program execution

• Checking movement during feeding operations

• Creating position data through feeding operations and teaching

When feeding operations are performed using a manual pulse generator or jogging operations from the PC, the Teaching Box is mainly used for monitoring the present position.

1-2 System Configuration

Teaching Box Connection

Teaching Box

CV500-CN22A/42A/62A
Connecting Cable

CV500-CN224/424/624
Connecting Cable

CV500-CN224/424/624
Connecting Cable

Position Driver

MC Unit

Position
Control Unit

CPU Unit

CPU Unit

Power Supply Unit

CV500-CIF11/CIF21
Adapter

Power Supply Unit

CPU Unit

Servo Driver

Servo Driver

I/O

Power Supply
Unit

Servomotor

Servomotor

Servomotor
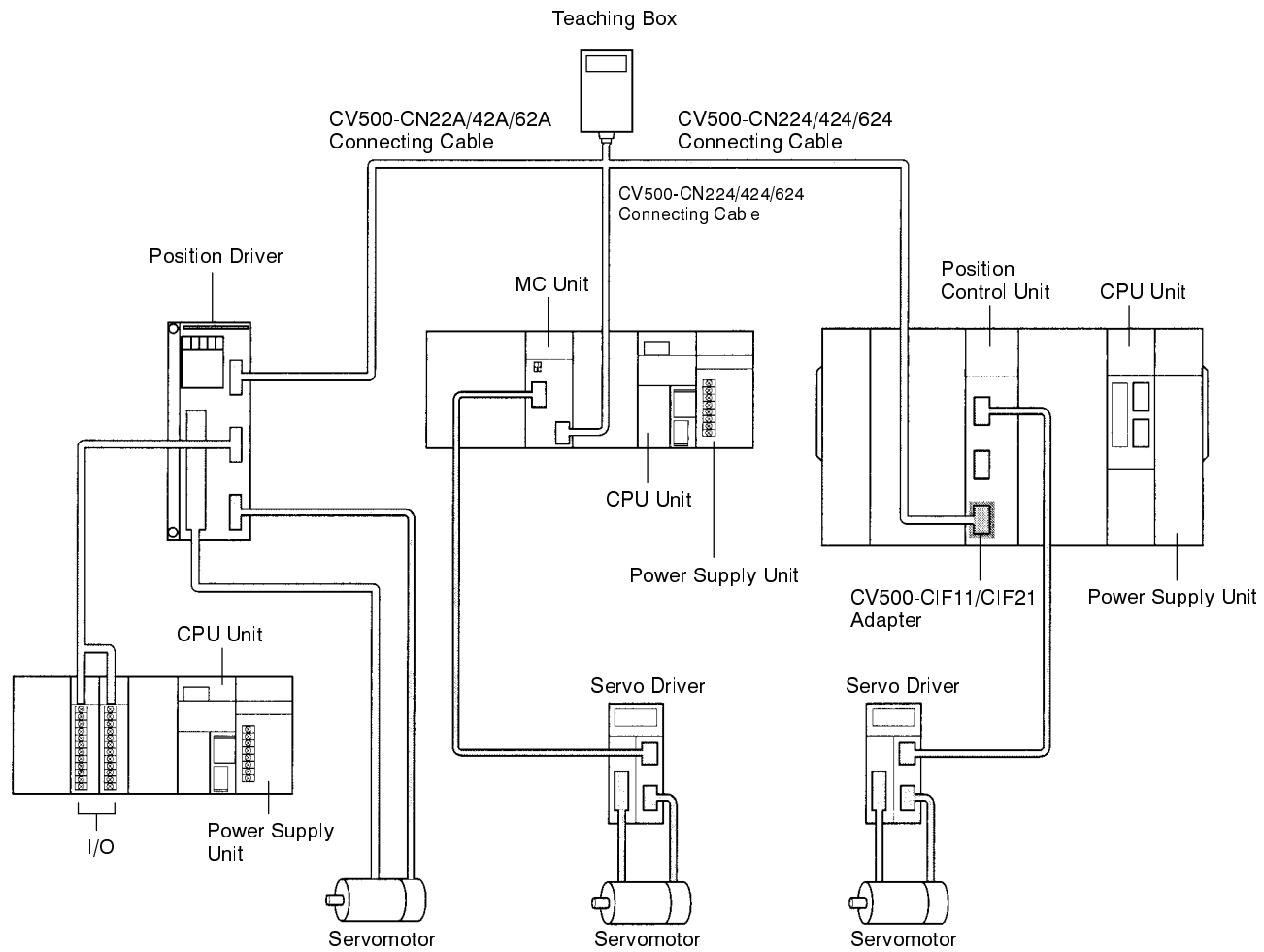
Note Only one Teaching Box can be connected to a Unit. It cannot be connected to more than one Unit.

Peripheral Device Connection

In this connection example, a C500-NC222-E Position Control Unit is used.

Teaching Box

CV500-CN224/424/624 Connecting Cable

Position Control Unit
C500-NC222-E
C500-NC111-EV1/112

CPU Unit
SYSMAC
C500(F)
C1000(F)
C2000H
CV500
CV1000
CV2000
CVM1

Power Supply Unit

CV500-CIF11/CIF21 Adapter

Power Supply Unit

External Input

CCW limit input
CW limit input
Origin proximity input
Deceleration stop input

24-V power supply for I/F

Servo Driver

Servomotor

1-3 Table of Operations

The following table lists the operations of the Teaching Box.

When C500-NC222-E is Used

Operation		Description	Page
Editing PCU data	Position data	Reads and changes PCU data. Position data can be inserted or deleted.	37
	Parameters		
	Speed data		
Clearing PCU data	All clear	Initializes PCU data.	27
	Block clear		
	Address clear		
Monitor	Present position	Displays axis status.	70
	Present address		
	M code		
	Dwell time		
	Error code		
	Deviation counter		
	Speed override	Changes override.	
Origin search		Executes origin search. The deviation from the Z phase is displayed.	71
Start, home shift		Performs positioning for a designated address.	72
Jogging		Jogs specified axes. Interpolation is also possible.	74
Inching		Inches specified axes. Interpolation is also possible.	75
Teaching		Takes the present position for the position data.	76
Changing present position		Changes the present position.	77
Deceleration stop		Decelerates specified axes to a stop.	78
Emergency stop		Forcibly stops all axes.	78
Setting OUT1 and OUT2 Outputs		Outputs OUT1 and OUT2.	78
EEPROM write/read		Reads to and writes from Position Control Unit's EEPROM.	79, 79
Error reset		Resets errors.	80
Protect	PC protect	Masks commands from Programmable Controller.	81
	External input protect	Masks commands from external inputs.	81
Command tracing		Reads OP codes of executed commands and I/O status of X and Y axes.	82
Servomotor free		Sets a designated axis to servomotor lock or servomotor free.	83
Switching operating mode		Switches Position Control Unit mode to PROGRAM, RUN, or MONITOR.	12

When 3G2A5-NC111-EV1 is Used

Operation		Description	Page
Editing PCU data	Position data	Reads and changes PCU data. Position data can be inserted or deleted.	85
	Parameters		
	Speed data		
Clearing PCU data		Initializes PCU data.	27
Origin search		Executes origin search.	98
Origin return		Returns to origin from any position.	98
Program operation, step execution		Specifies the address and runs the program.	98
Manual operation	High speed	Executes manual operation at high or low speed, in either the CW or CCW direction.	99
	Low speed		
Teaching		Takes the present position for position data.	99
Emergency stop		Executes emergency stop for axes being operated.	100

1-4 Nomenclature and Functions

Shown below are the parts, functions, and key arrangement of the Teaching Box.

Cable connector

LCD display

Contrast control knob

Volume control knob

LED indicator

Operating keys

ROM Cassette
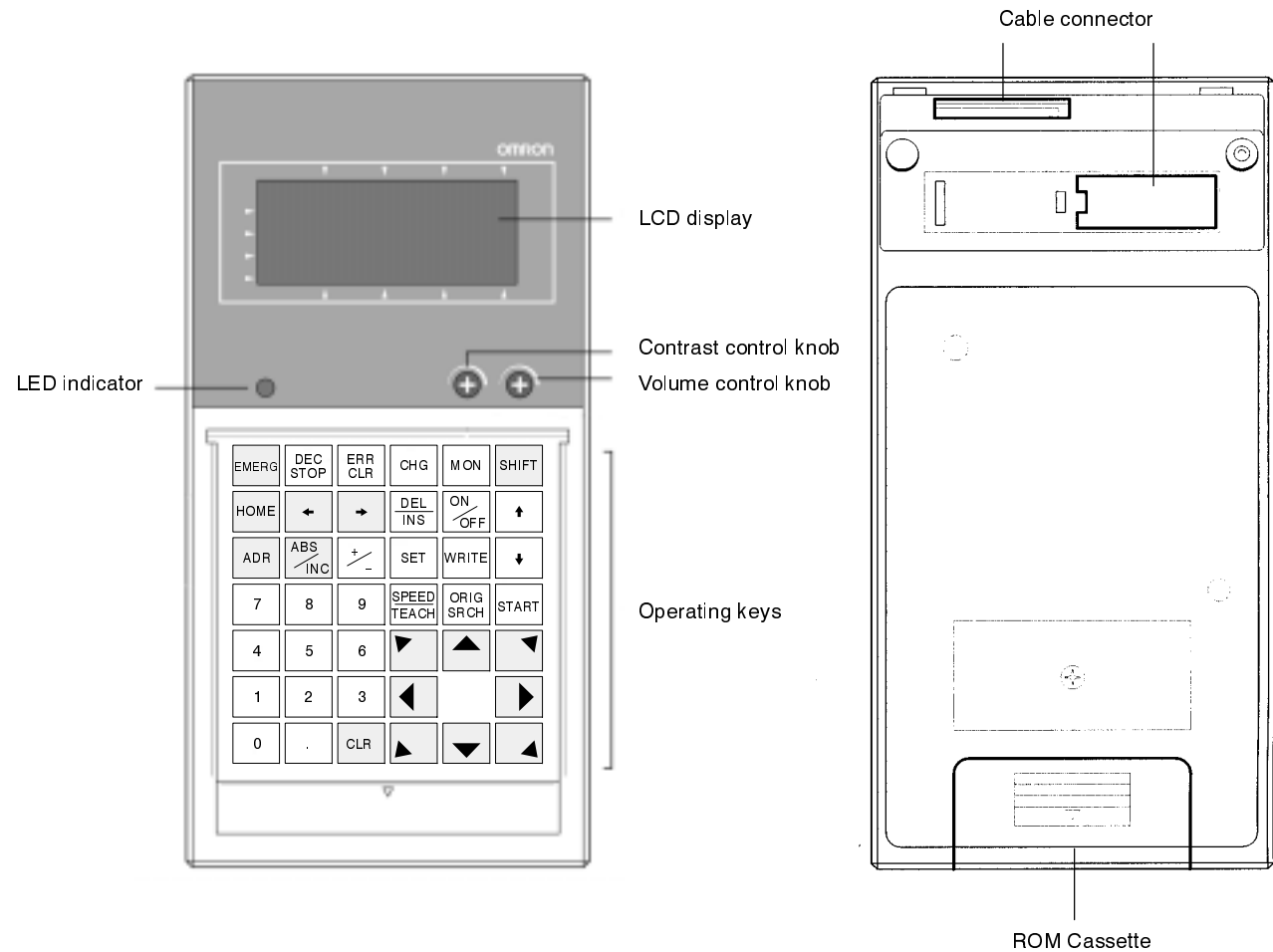
Part	Function
LCD display	Displays various data. Illuminated by LED.
LED indicator	Not used.
Contrast control knob	Used to control the contrast of the LCD display.
Volume control knob	Used to control the buzzer sound produced when an input is made by pressing keys or when an error occurs.
Operating keys	Refer to the following pages.

Key Sheets   The following key sheets are used when the indicated Position Control Units are connected.

3G2A5-NC111-EV1
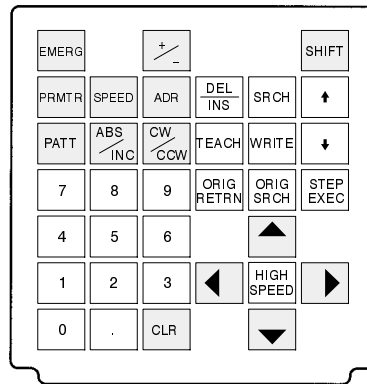
Key Functions (C500-NC222-E)

Key	Function
Emergency stop (EMERG)	For stopping the motor in emergencies.
Deceleration Stop (DEC STOP)	For decelerating the motor to a stop.
Error clear (ERR CLR)	For clearing errors on the PCU.
Change (CHG)	For changing the position set for a positioning action to the current position of the positioning system.
Monitor (MON)	For monitoring the condition of operating motors.
Shift (SHIFT)	For changing functions of other keys.
Cursor reset (HOME)	For returning to the initial display from any other display.
◀ and ▶	For moving the cursor.
Delete/insert (DEL/INS)	For deleting or inserting entered positioning actions.
ON/OFF (ON/OFF)	For designating control output signal status.
+/–	For designating the sign of a position.
Mode setting (SET)	For designating menu items selected on displays.
Write (WRITE)	For writing data.
▼, ▲	For scrolling to the previous or next display.
Speed/Teaching (SPEED/TEACH)	For setting speeds. For teaching.
Origin search (ORIG SRCH)	For moving the shaft to the origin.
Start (START)	For positioning to the designated address.
Clear (CLR)	For clearing the set PCU data.
Numerical keys	For entering PCU data.
Jogging keys	For jogging or inching in the allowed directions.

Key Functions (3G2A5-NC111-EV1)

Key	Function
Emergency stop (EMERG)	For stopping the motor in emergencies.
+/−	For designating the sign of a position.
Shift (SHIFT)	For changing functions with other keys.
Parameter (PRMTR)	For reading and setting parameters.
Speed (SPEED)	For reading and setting speeds.
Sequence (ADR)	For reading and setting positioning actions.
Pattern (PATT)	For setting positioning patterns.
Absolute/Increment (ABS/INC)	For designating a position as relative to the origin (absolute) or relative to the current position (increment).
Clockwise/Counterclockwise (CW/CCW)	CW: Positioning in the clockwise direction. CCW: Positioning in the counterclockwise direction.
Delete/insert (DEL/INS)	For deleting or inserting entered positioning actions.
Search (SRCH)	For searching for positioning actions.
Teaching (TEACH)	For teaching.
Write (WRITE)	For writing data.
�úsqueda and ▲	For scrolling to the previous or next display.
Origin return (ORIG RETRN)	For returning the axis to the origin from any position.
Origin search (ORIG SRCH)	For moving the axis to the origin.
Stepwise execution (STEP EXEC)	For moving the motor according to the positioning action of the designated.
Clear (CLR)	For clearing the set PCU data.
High speed (HIGH SPEED)	For manual high-speed operation.
Numerical keys	For entering PCU data.
Jogging keys	For jogging or inching in the allowed directions.

1-5　Operating Procedure

Follow the procedure outlined below to operate axes using the Teaching Box.

C500-NC222-E

```
            ┌────────────────────────────┐
            │ Connect Teaching Box to     │──────── Refer to 3-1
            │ Position Control Unit.       │
            └────────────────────────────┘
                          │   (When using for the first time after purchase,
                          │    or when changing connected models.)
                          ▼
            ┌────────────────────────────┐
            │ Set connected models.       │──────── Refer to 3-3
            └────────────────────────────┘
  (When NC222 has already        (See note 1)
   been selected.)        │
                          ▼
            ┌────────────────────────────┐
            │ Set the display for English │──────── Refer to 3-4
            │ or Japanese.                │
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Set up online connection    │──────── Refer to 4-1
            │ with Position Control Unit.  │
            └────────────────────────────┘
                          │   (See note 2)
                          ▼
            ┌────────────────────────────┐
            │ Enter password.             │──────── Refer to 4-1
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Set Position Control Unit's │──────── Refer to 4-2
            │ mode.                       │
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Select axes.                │──────── Refer to 4-4
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Set addresses.              │──────── Refer to 4-4
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Clear all data.             │──────── Refer to 4-5
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Set data.                   │──────── Refer to Section 5
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Establish origin.           │
            │ (Use origin search or set   │──────── Refer to Section 6
            │ present value.)             │
            └────────────────────────────┘
                          │
                          ▼
            ┌────────────────────────────┐
            │ Operate axes.               │
            └────────────────────────────┘
```

Note　1. Turning on the PC power while pressing the Clear Key will display a screen for selecting the models to be connected.

2. The online connection is to enable the exchange of data between the Teaching Box and the Position Control Unit.

3G2A5-NC111-EV1

```
                    ┌──────────────────────────┐
                    │ Connect Teaching Box to   │────────  Refer to Section 3-1
                    │ Position Control Unit.    │
                    └──────────────────────────┘
                          │  (When using for the first time after purchase,
                          │   or when changing connected models.)
                          ▼
                    ┌──────────────────────────┐
                    │ Set connected models.     │────────  Refer to Section 3-3
 (When NC111-EV1/112 has └──────────────────────────┘
  already been selected.)      (See note 1)
                          │
                          ▼
                    ┌──────────────────────────┐
                    │ Set the display for       │────────  Refer to Section 3-4
                    │ English or Japanese.      │
                    └──────────────────────────┘
                          │
                          ▼
                    ┌──────────────────────────┐
                    │ Set up online connection  │────────  Refer to Section 4-1
                    │ with Position Control Unit.│
                    └──────────────────────────┘
                          │  (See note 2)
                          ▼
                    ┌──────────────────────────┐
                    │ Clear all data.           │────────  Refer to Section 4-6
                    └──────────────────────────┘
                          │
                          ▼
                    ┌──────────────────────────┐
                    │ Set data.                 │────────  Refer to Section 7
                    └──────────────────────────┘
                          │
                          ▼
                    ┌──────────────────────────┐
                    │ Establish origin.         │────┐
                    │ (Use origin search or set │    │
                    │ present value.)           │    │ Refer to Section 8
                    └──────────────────────────┘    │
                          │                           │
                          ▼                           │
                    ┌──────────────────────────┐    │
                    │ Operate axes.             │────┘
                    └──────────────────────────┘
```

Note   1. Turning on the PC power while pressing the Clear Key will display a screen for selecting the models to be connected.

2. The online connection is to enable the exchange of data between the Teaching Box and the Position Control Unit.

SECTION 2
Position Control Unit Operation

This section explains the operating principles, ways of delivering instructions, C500-NC222-E Position Control Unit modes, and the operations that can be performed using the Teaching Box. Be sure that you understand all of the subjects covered in this section before attempting any actual operations.

2-1 Controlled Objects and Instructions to PCU

Controlled Objects

The basic objects of control are the axes. Axes can be controlled either in combination or independently. (With the 3G2A5-NC111-EV1, they are controlled independently.)

Commands to PCU

There are two methods for sending instructions to the Position Control Unit: ladder programs and the Teaching Box. It is also possible to combine the two systems, as shown in the following diagram.
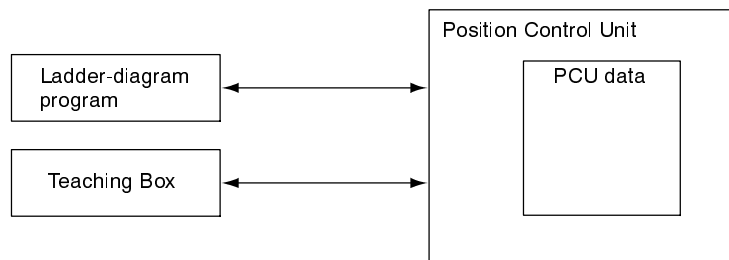
2-2 C500-NC222-E Operating Modes

C500-NC222-E Position Control Units have three operating modes, as shown in the following table. These modes are provided to assure the safety of the user, and to prevent problems that could arise from the two methods of sending instructions to the Position Control Unit.

• When performing operations other than monitoring, the mode must be changed to either PROGRAM or DEBUG.

• The Teaching Box can be used to change the operating mode. For details, refer to *4-2 Changing the C500-NC222-E Operating Mode*.

Mode	Explanation
MONITOR	When in MONITOR mode, only monitoring can be performed from the Teaching Box. This mode is normally used only for monitoring the present value.
DEBUG	The only operation possible in DEBUG mode is debugging. Use this mode to execute command trace and debug the program.
PROGRAM	Most Position Control Unit operations are enabled in PROGRAM mode. Use this mode for editing PCU data and operating the PCU.

The operations that can be performed using the Teaching Box are limited according to the operating mode that is set for the Position Control Unit. The following table shows the operations that are possible in each mode.

Function		Operating mode		
		DEBUG	MONITOR	PROGRAM
Editing PCU data	Position data	No	No	OK
	Parameters	No	No	OK
	Speed data	No	No	OK
Clearing PCU data	Position data	No	No	OK
	Parameters	No	No	OK
	Speed data	No	No	OK
Monitoring	Present value	No	OK	OK
	Present address	No	OK	OK
	M code	No	OK	OK
	Dwell time	No	OK	OK
	Error code display	No	OK	OK
	Deviation counter	No	OK	OK
	Speed override	No	No	OK
Origin search		No	No	OK
Start, home shift		No	No	OK
Jogging		No	No	OK
Inching		No	No	OK
Teaching		No	No	OK
Changing present position		No	No	OK
Deceleration stop		No	No	OK
Emergency stop		No	No	OK
Setting OUT1 and OUT2 Outputs		No	No	OK
EEPROM write/read		No	No	OK
Error reset		OK	OK	OK
Protect	PC protect	OK	No	No
	External input protect	OK	No	No
Command tracing		OK	No	No
Servomotor free		No	No	OK
Switching operating mode		OK	OK	OK

SECTION 3
Connecting the Teaching Box

This section describes the procedures for connecting the Teaching Box, installing it in a control panel, and changing displays.

3-1 Connecting to the Position Control Unit

The procedure for connecting the Teaching Box to the Position Control Unit is described below.

Note
1. Be sure that the power supply is turned off before mounting or removing the ROM Cassette.

2. For a connecting cable with a lock mechanism, be sure that the lock is securely fastened.

Connecting Cables

Use a CV500-CIF11/21 Adapter with the Connecting Cables listed below (sold separately) to connect the Teaching Box to the Position Control Unit.

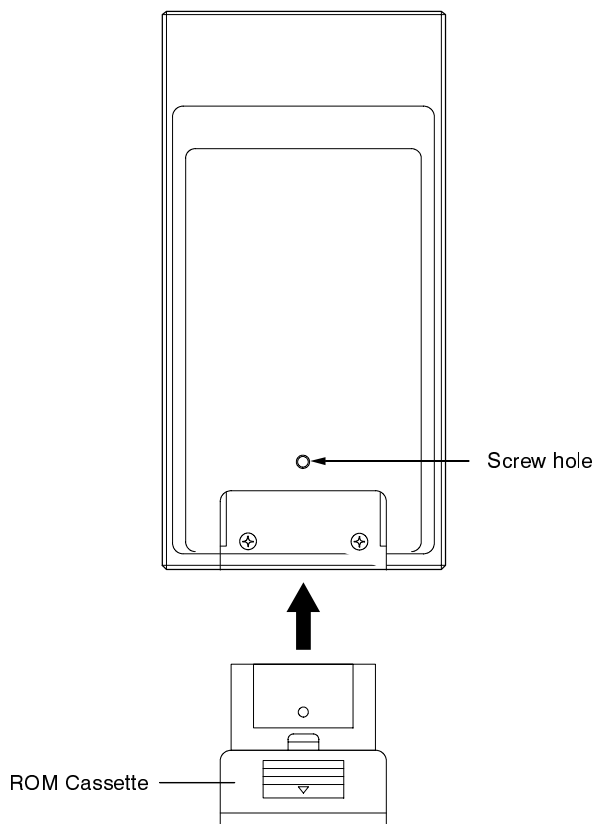| Model	Cable length
CV500-CN224	2 m
CV500-CN424	4 m
CV500-CN624	6 m

Attaching the Key Sheet

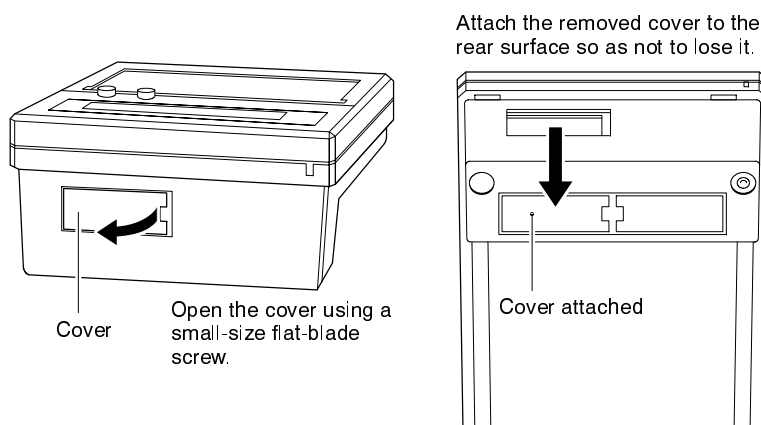Attach the key sheet to the Position Control Unit as shown below.
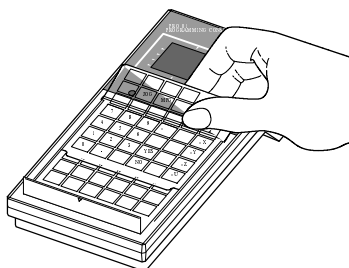
Installing the ROM Cassette

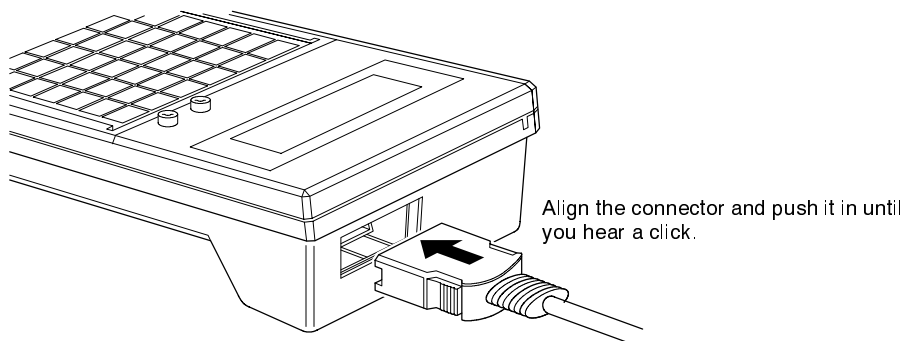Install the ROM Cassette as shown below, and secure it with five M3 screws.

Screw hole

ROM Cassette

Connecting to the Position Control Unit

1, 2, 3...   1. Remove the connector cover.

Attach the removed cover to the
rear surface so as not to lose it.

Cover

Open the cover using a
small-size flat-blade
screw.

Cover attached

2. Plug the Connecting Cable's connector into the Teaching Box's connector.

Align the connector and push it in until
you hear a click.

3. Mount the Adapter to the end of the Connecting Cable that is to be connected to the Position Control Unit.

4. Insert the Connecting Cable's connector into the Position Control Unit's peripheral connector. The location of the peripheral connector on each of the Position Control Units is shown below.
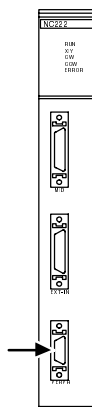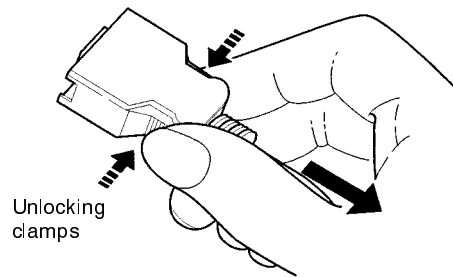
C500-NC222-E   3G2A5-NC111-EV1
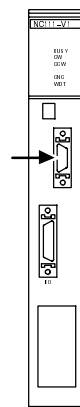
Removing the Cable
Using your fingers, press in and hold the clamps on both sides of the connector and pull out the connector.

Unlocking
clamps

Adjusting the Buzzer and Display Contrast
Turn the volume control knob to adjust the loudness of the buzzer.

Turn the contrast control knob to adjust the contrast of the LCD display.

Contrast control knob

Volume control knob
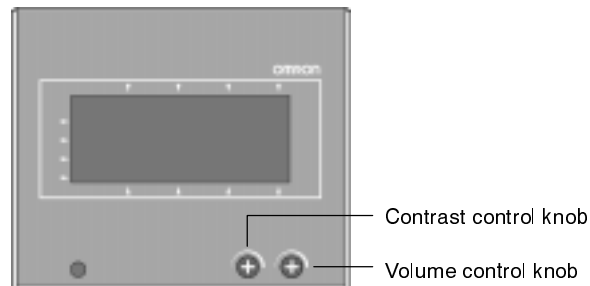
3-2   Installing in a Panel

The procedure for installing the Teaching Box in a panel is described below.

Use the C200H-ATT01 Mounting Bracket (sold separately) to instal the Teaching Box in a panel.

Note When using the Teaching Box inside a control panel, be sure to maintain the ambient temperature and relative humidity within the specified ranges.

1, 2, 3...   1. Prepare mounting holes according to the following diagram.

Mounting Hole Dimensions
The following is a standard panel cut.
(Conforming to DIN43700)

$186_0^{+1.1}$

$92_0^{+0.8}$
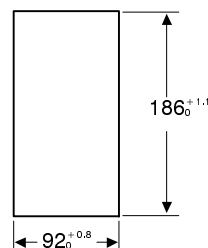
2. Provide sufficient spaces so that the connector can be easily connected or disconnected to/from the Teaching Box.

80 mm min.

Use either one of the connectors.

70 mm min.
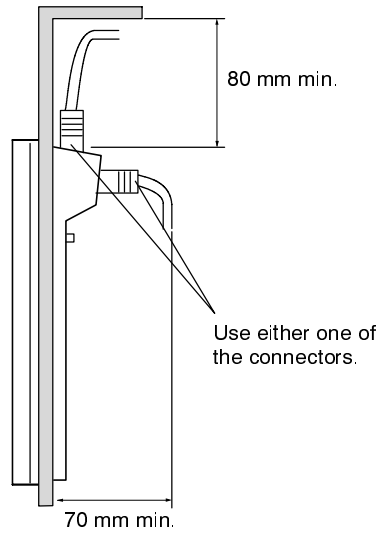
3. Mount the Teaching Box, aligning with the mounting holes and tighten the Mounting Bracket from the back side using screws.

Mounting Bracket

Two screws

Panel thickness: 1.0 to 3.2 mm

External dimensions of the Mounting Bracket

75.5

116

9.1

14.1
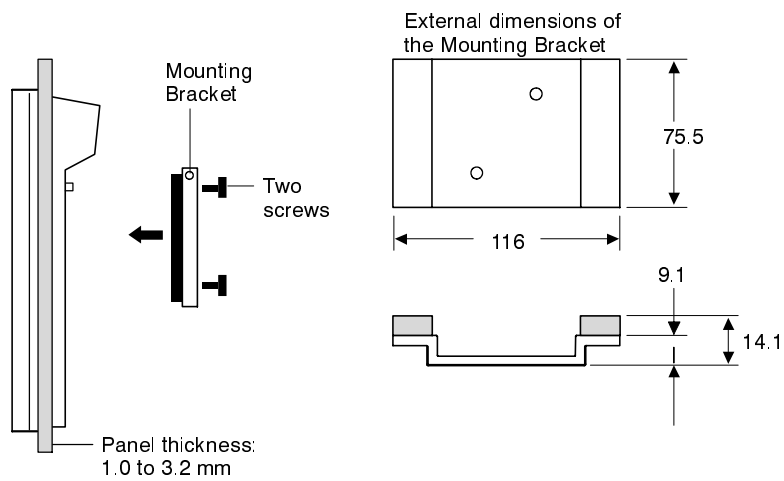
3-3   Selecting the Connected Model

Set the model that the Teaching Box is connected to. Select one of the following:

• MC Series (Motion Control)

• C500-NC222-E Position Control Unit

• 3G2A5-NC111-EV1 Position Control Unit

• Servo Driver (Position Driver)

The MC Series is the default setting. Use the procedure outlined below to set the Position Control Unit that is to be used. Select the model that was connected as described in *3-1 Connecting to the Position Control Unit.*

1, 2, 3...   1. Turn on the power to the PC.
The following screen will be displayed.

When MC Series is selected

```
TBOX-V1.00
 MC SERIES

↑:SET  CLR:CONN
```

When C500-NC222-E is selected

```
TBOX-V1.00
 NC222

↑:SET  CLR:CONN
```

When 3G2A5-NC111-EV1 is selected

```
TBOX-V1.00
 NC111-V1/NC112

↑:SET  CLR:CONN
```

When Servo Driver is selected

```
TBOX-V1.00
 SERVODRIVER
 9600
↑:SET  CLR:CONN
```

2. Press the Up Arrow Key.

```
MODEL SETTING
1:MC SERIES
2:NC222
3:NC111V1/NC112▼
```

3. To select one of the Position Control Units, press either "2" or "3."

4. To restore the initial screen, press the CLR Key.

3-4   Changing the Display Language (English/Japanese)

The default setting for the Teaching Box display language is English. The procedure for changing the display to Japanese is explained below. For this explanation it is assumed that the Teaching Box is connected to the Position Control Unit as described in *3-1 Connecting to the Position Control Unit.*

Note   Before performing this operation, be sure that the power to the PC is off.

1, 2, 3...   1. Turn on the power to the PC.

```
TBOX-V1.00
 MC SERIES

↑:SET  CLR:CONN
```

2. Press the Up Arrow Key.

```
MODEL SETTING
1:MC SERIES
2:NC222
3:NC111V1/NC112▼
```

3. Press either "2" or "3."

```
OFFLINE MENU
1:MESSAGE SET
```

4. Press "1."

```
MESSAGE SETTING
1:ENGLISH
2:JAPANESE
```

5. Press either "1" or "2."

<h1 style="text-align:right">SECTION 4
Basic Operations</h1>

This section contains information on the basic operations necessary for operating the Teaching Box. Be sure to read this section to fully understand the basic operations before reading detailed explanations of each function given in subsequent sections.

4-1 Initial Operation

This section describes the screen following powerup and explains online connection with the Position Control Unit.

1, 2, 3...   1. Turn on the power to the PC. The following display will appear.

C500-NC222-E

```
TBOX-V1.00
 NC222

↑:SET  CLR:CONN
```

3G2A5-NC111-EV1

```
TBOX-V1.00
 NC111-V1/112

↑:SET  CLR:CONN
```

2. Press the CLR Key.

C500-NC222-E

```
NC222
CONNECTED
```

3G2A5-NC111-EV1
(NC111-EV1 remote/local selection)

```
NC111-V1/112
CONNECTED
```

The following display will appear after about two seconds.

C500-NC222-E

```
 NC222  SELECT
```

3G2A5-NC111-EV1

```

```

3. For the C500-NC222-E, enter the password to clear the Teaching Box protect. Press the CLR Key and then press the SHIFT and MON Keys.

CLR   PASSWORD!

SHIFT MON   TEACHING MODE
PROG DEBUG MON

Also, to put the Teaching Box back in protect status, press the SHIFT and MON Keys.

Note The password serves to avoid accidents by preventing operations from being started inadvertently and by denying access to unqualified personnel.

4. Next, perform key operations as required.

4-2 Changing the C500-NC222-E Operating Mode

This operation applies only to the C500-NC222-E Position Control Unit, and not to the 3G2A5-NC111-EV1.

The C500-NC222-E Position Control Unit has three modes: PROGRAM, DEBUG, and MONITOR. The following table shows the functions of each mode and the status of commands from the PC.

Mode	Function	PC commands
PROGRAM	All operations allowed.	All commands enabled.
DEBUG	Only debugging allowed.	All commands enabled until PC Protect turns ON.
MONITOR	Monitors axis operations.	All commands enabled.

Note For details regarding these modes, refer to *2-2 C500-NC222-E Operating Modes*.

To edit PCU data or to operate the PCU using the Teaching Box, set the PCU to PROGRAM mode.

Procedure Use the following procedure to change the mode to the DEBUG mode.

1, 2, 3... 1. From the online connection screen, enter the password. Press the CLR Key, and then press the SHIFT and MON Keys as shown below.

| CLR | PASSWORD! |

| SHIFT | MON | TEACHING MODE
PROG DEBUG MON |

2. Use the Right Arrow Key to move the cursor to DEBUG.

| → | TEACHING MODE
PROG DEBUG MON |

3. Press the SET Key.

4-3 Basic Input Operations

Basic input operations that are common in the Teaching Box operations are explained below.

Basic Operation 1 **Inputting Numeric Values**

Use the 0 to 9, ., +/– Keys to input numeric values.

When a numeric value is input, the previous value is deleted.

| AD-200 POS
0P _ |

| 1 | 2 | 3 | AD-200 POS
123P _ |

If the number just input is wrong, press the CLR Key. This will change the setting the screen to 0, but the internal data will remain unchanged.

| CLR | AD-200 POS
0P _ |

Basic Operation 2 **Setting the Values that Have Been Input**

After the numeric values have been input, press the WRITE Key.

• Press the WRITE Key when entering data, such as positioning actions, that must be saved to the system.

• When there are multiple input items to set, pressing the WRITE Key moves the cursor to the next item.

Basic Operation 3

Returning to the Initial Display

With the C500-NC222-E, the HOME, CLR, and SET Keys can be used to return to the initial display. For details, refer to *4-4 Basic Operations With the C500-NC222-E*.

Basic Operation 4

Buzzer Operation

The various buzzer sounds have the following meanings.

Sound	Meaning
Beep (short)	A valid key was pressed.
Beep-beep-beep (short)	An operation was attempted for an axis that is not controlled by the Position Control Unit.
	An invalid key was pressed.
	An error occurred.
Beep (longer)	An attempt was made to execute an invalid function for the current display.

Basic Operation 5

Cursor Display (When C500-NC222-E is Selected)

• The cursor is displayed on the screen as required when the C500-NC222-E is selected.

• The cursor appears as a "–" mark at the first input item only in screens that require input of numeric values.

4-4 Basic Operations With the C500-NC222-E

This section explains essential operations for editing PCU data and operating the PCU, such as selecting axes, setting addresses, and returning to the initial screen.

Selecting the Axis or Axes for Operation

For operations in PROGRAM mode, the axis or axes that are to be operated must be selected first.

When the X axis is selected, operations will only be executed with respect to the X axis. When the Y axis is selected, operations will only be executed with respect to the Y axis. When both the X and Y axes are selected, operations will be executed with respect to both axes.

Use the following procedure to select the axis or axes. In this example, both axes are selected.

1, 2, 3...   1. From the teaching mode screen, select "PROG" to enter the PROGRAM mode.

```
 MODE SELECT
AXIS ERR OUT FUN
_
```

2. Press the SET Key to select the axis or axes indicated by the cursor.

```
[SET]   ASIX SELECT
        X_Y XY
```

3. To select an axis or axes other than the one currently indicated, use the Right and Left Arrow Keys to move the cursor, and the press the SET Key.

The leading address for the selected axis or axes will be displayed. In this example, the leading address (100) for the XY mode is displayed.

```
XY MODE SELECTED
AD     100          _
```

Setting Addresses

For operations such as reading, writing, inserting, or deleting data, it is necessary to set the address. Use the following procedure to set the address. In this example, the X axis is selected and the address "123" is set.

1, 2, 3...   1. Select the axis for which the address is to be set, and press the SET Key.

```
[SET]   X MODE SELECTED
        AD     100          _
```

2. Input a 3-digit number ("123" in this example).

| 1 | 2 | 3 | X MODE SELECTED
AD   123   _ |

Returning to the Initial Screen

From any screen it is possible to return to three kinds of initial screen.

Procedure 1: Returning to the Initial Edit Screen
To return to the initial edit screen, press the HOME Key from within any screen, and press the CLR Key.

| HOME | _AD-100 POS
      10000P |

| CLR | X MODE SELECTED
AD   100   _ |

Procedure 2: Returning to the Basic Mode Selection Screen
To return to the basic mode selection screen, press the HOME Key from within any screen, and press the CLR Key.

| HOME | _AD-100 POS
      10000P |

| SET | MODE SELECT
_AXIS ERR OUT FUN |

Procedure 3: Returning to the Operating Mode Selection Screen
To return to the operating mode selection screen, press the HOME Key twice.

| HOME | _AD-100 POS
      10000P |

| HOME | TEACHING MODE
PROG DEBUG MON_ |

4-5   Deleting Data From a C500-NC222-E PCU

This operation deletes data that has been internally written in a C500-NC222-E Position Control Unit.

The operation explained here pertains only to C500-NC222-E Position Control Units. For an explanation of how to delete data from a 3G2A5-NC111-EV1 Position Control Unit, refer to *4-6 Deleting Data from a 3G2A5-NC111-EV1 PCU*.

There are three ways to delete PCU data: all clear, block clear, and address clear.

Deletion method	Function
All clear	Deletes all PCU data.
Block clear	Deletes data in block units (i.e., by type of data).
Address clear	Deletes data in specified range of addresses.

The data items that can be deleted for each of the axes are shown in the following table.

Axis or axes	Items that can be deleted
X	Position data, parameters, dwell times, acceleration/deceleration patterns, synchronized position data, zones
Y	Position data, parameters, dwell times, acceleration/deceleration patterns, synchronized position data, zones
XY	Speed data

Note When newly writing data, be sure to use the "all clear" method.

Procedure 1

Clearing All Data

1, 2, 3...   1. From within the basic mode selection screen, press the Right Arrow Key three times to select FUN, and press the SET Key.

| → | → | → | MODE SELECT
AXIS ERR OUT FUN   _ |

| SET | FUN SELECT
MCLR ROM SERVO
_ |

2. Press the SET Key to select MCLR.

| SET | DATA CLEAR
A_LL BLK AD |

3. Press the SET Key to select ALL.

| SET | ALL DATA CLEAR
X_Y XY |

4. Use the Right and Left Arrow Keys to select the axis, and press the SET Key. (In this example, the X axis is selected.)

| SET | ALL DATA CLEAR
X_ |

5. Press the SHIFT Key and then the CLR Key. The data will be deleted, and the screen from step 3. will return.

| SHIFT | CLR | ALL DATA CLEAR
X_Y XY |

To delete data from another axis, repeat steps 4. and 5.

Procedure 2 **Clearing a Block of Data**

1, 2, 3... 1. Perform steps 1. and 2. of Procedure 1, and press the Right Arrow Key followed by the SET Key.

| → | DATA CLEAR
ALL BLK_AD |

| SET | POS DATA
CLEAR X Y X_Y |

2. Use the Right and Left Arrow Keys to select the axis, and press the SET Key. (In this example, the X axis is selected.)

| ← | / | → | SET | POS DATA
CLEAR X   _ |

3. Press the SHIFT Key and then the CLR Key. The data will be deleted.

If the data is not to be deleted for a particular item, press the Down Arrow Key to bring up the screen for the next item.

| SHIFT | CLR | PARAMETER DATA
CLEAR   X   _ |

4. The order of the data items is as follows: dwell time — acceleration/deceleration pattern — synchronous position data zone data — speed data. This order is the same for the method in Procedure 3.

| ↓ | DWELTIME
CLEAR   X   _ |

| | ACC/DCC PTN
CLEAR   X   _ |

| | SYNC-DATA
CLEAR   X   _ |

| | ZONE-DATA
CLEAR   X   _ |

| | SPD DATA
CLEAR   X   _ |

```
DATA CLEAR
ALL BLK AD
```

Procedure 3   **Clearing a Range of Address**

This method clears the data in a specified range of addresses. For the purposes of this explanation, the data in addresses 100 to 200 is cleared as an example. Set the data within the ranges shown in the following table.

Note It is not possible to classify data or to specify addresses extending across both the X and Y axes.

Axis Data item	X axis	Y axis
Positioning action	100 to 399	500 to 799
Parameter	400 to 420	800 to 820
Dwell time	450 to 459	850 to 859
Acceleration and deceleration time	460 to 469	860 to 869
Synchronization positioning action	470 to 479	870 to 879
Zone data	480 to 487	880 to 887
Speed	900 to 999	

1, 2, 3...   1. Perform steps 1. and 2. of Procedure 1, and press the Right Arrow Key twice to select AD. Then press the SET Key.

$\boxed{\rightarrow}$ $\boxed{\rightarrow}$
```
DATA CLEAR
ALL BLK AD      _
```

$\boxed{\text{SET}}$
```
CLEAR AD
 FROM  0 TO  0_
```

2. Input the leading address (a 3-digit number) of the data to be deleted, and press either the Right Arrow Key or the SET Key.

$\boxed{1}$ $\boxed{0}$ $\boxed{0}$ $\boxed{\rightarrow}$
```
CLEAR AD
 FROM100 TO  0        _
```

3. Input the ending address (a 3-digit number) of the data to be deleted.

$\boxed{2}$ $\boxed{0}$ $\boxed{0}$
```
CLEAR AD
 FROM100 TO 200       _
```

4. Press the SHIFT Key and then the CLR Key. The specified range of data will be deleted.

```
CLEAR AD
 FROM  0 TO  0_
```

4-6   Deleting Data From a 3G2A5-NC111-EV1 PCU

This operation deletes data that has been internally written in a 3G2A5-NC111-EV1 Position Control Unit. It deletes all positioning actions, parameters, and speeds.

Note When newly writing PCU data, be sure to first delete the previous data.

1, 2, 3...   1. Press, in order, the CLR Key and then the keys shown below.

$\boxed{.}$ $\boxed{\genfrac{}{}{0pt}{}{+}{-}}$
```
DATA CLEAR?
```

2. Press the SHIFT Key and then the DEL/INS Key as shown below.
   The PCU data will be deleted.

(NC112 Screen)
$\boxed{\text{SHIFT}}$ $\boxed{\genfrac{}{}{0pt}{}{\text{DEL}}{\text{INS}}}$
```
DATA CLEAR
END
```

4-7   Operations for Handling Errors

This section explains the operations for when errors occur and error messages are displayed.

C500-NC222-E

If an error occurs while selecting AXIS, OUT, or FUN from the basic mode selection screen, the error message will automatically be displayed on the screen.

```
XAD 101XMCODE
YAD 501YMCODE
```

(X-axis over-travel error occurs.)

```
ERROR 11
X OVER TRAVEL
```

Remove the cause of the error, and press the CLR Key. The error message will then be reset.

```
XAD 101XMCODE
YAD 501YMCODE
```

For details regarding errors, refer to *Appendix B Error Code Displays and Error Processing*.

Errors can be displayed by selecting ERR from the basic mode selection screen. Refer to *6-13 Error Displays*.

Clearing Errors

To clear an error, press the ERR CLR Key from the screen in which the error occurred.

```
ERROR10
X OVER TRAVEL
```

```
ERR     XAD 101XMCODE 11
CLR     _XPOS     5678P
```

3G2A5-NC111-EV1

The contents of an error occurring at the Position Control Unit will automatically be displayed in the following format.
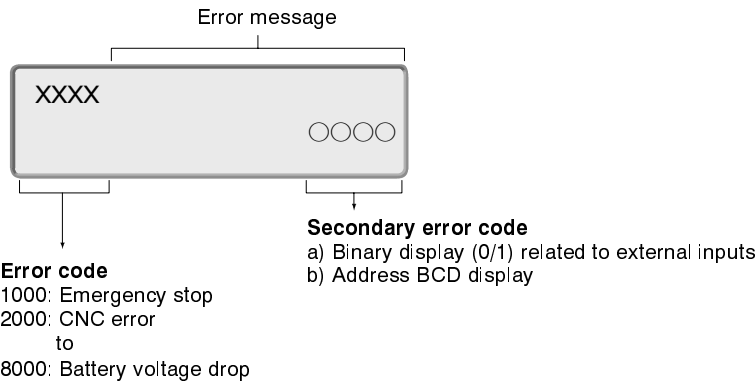
For the secondary error code, either an external input is displayed as 0 or 1, or the address of the data where the error occurred is displayed.

When an external input is displayed, the allocation will be as shown below, and the leftmost four digits will be displayed first. Press the Down Arrow Key to display the rightmost four digits.

Leftmost 4 digits   Rightmost 4 digits

| * | * | * | * | * | * | * | * |

Ready
Local
Emergency stop
CCW limit
CW limit
Origin
Origin
External interrupt
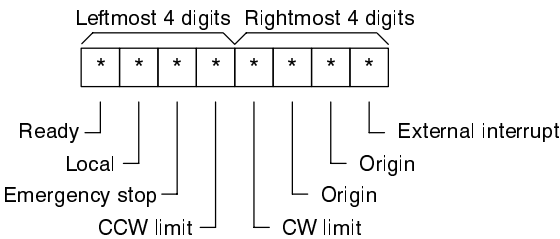
Meaning of asterisk (*):
0: OFF
1: ON

After removing the error, press the CLR Key.
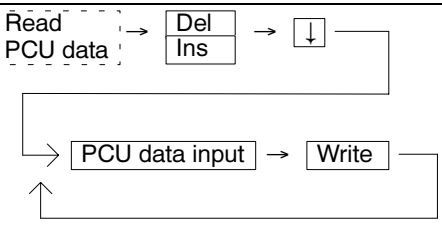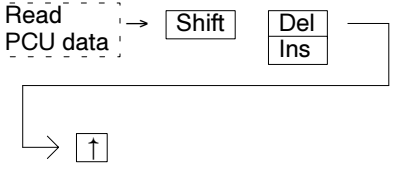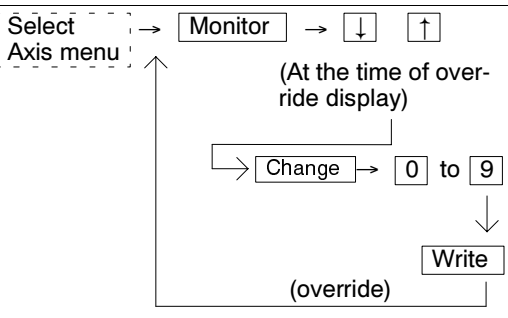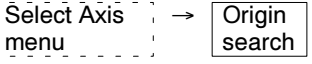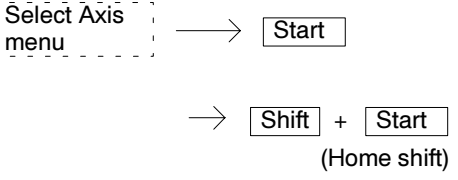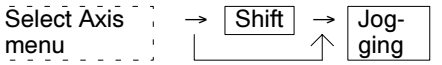
4-8 Table of Operations

The following table provides a summary of Teaching Box operations.

- The items enclosed by broken lines are the modes of the operations prior to the ones being executed.

- When entering numbers, it is not necessary to input leading zeroes. For example, you can simply input "2" instead of "00002."

C500-NC222-E

Operation name	Function	Available mode			Basic operating procedure	Page
		DEBUG	MONITOR	PROGRAM		
Axis selection	Selects X axis, Y axis, or X and Y axes from a menu.	No	No	Yes	Menu → → → Setting (X, Y, XY) ←	26
Data all clear	Clears all data selected.	No	No	Yes	(X, Y, XY) Menu selection → Clear axis selection → Shift Clear (All clear)	27
	Clears a block of X- and Y-axis parameters, positioning actions, dwell time, acceleration/deceleration times, synchronous positioning actions, and zone data.				Menu selection; (X, Y, XY) Clear axis select → Shift Clear — Positioning action; → Shift Clear — Parameters; → Shift Clear — Dwell time; → Shift Clear — Acceleration and deceleration time; → Shift Clear — Synchronization positioning action; → Shift Clear — Zone data; → Shift Clear — Speeds (Block clear)	

Operation name	Function	Available mode			Basic operating procedure	Page
		DEBUG	**MONITOR**	**PROGRAM**		
Inserting positioning actions	Writes a positioning action to a designated address and moves the prior positioning actions written at and beyond that address successively back one address each.	No	No	Yes	Read PCU data → Del/Ins → ↓ → PCU data input → Write The DEL/INS key is effective for inputting and displaying the first positioning action.	62
Deleting positioning actions	Deletes the positioning action at a designated address and shifts prior positioning actions past that address successively up toward the designated address.	No	No	Yes	Read PCU data → Shift → Del/Ins → ↑ The DEL/INS key is effective for displaying the first positioning action.	62
Monitor and override	Monitors the current position, current address, M code, and dwell time speed override and performs override changes.	No	No	Yes	Select Axis menu → Monitor → ↓ ↑ (At the time of over-ride display) Change → 0 to 9 → ↓ → Write (override) Override is effective in PROGRAM mode only.	70
Origin search	Moves an axis to the origin.	No	No	Yes	Select Axis menu → Origin search Origin search is not possible while the ERR, OUT, or FUN menu is selected.	71
Start, home shift start	Performs positioning for a designated address.	No	No	Yes	Select Axis menu → Start → Shift + Start (Home shift) Start home shift is not possible while the ERR, OUT, or FUN menu is selected.	72
Jogging and inching	Jogging and inching are executed on the axis selected in Axis mode.	No	No	Yes	Select Axis menu → Shift → Jog-ging	74 75

Operation name	Function	Available mode			Basic operating procedure	Page
		DEBUG	MONITOR	PROGRAM		
Teaching	Writes a position designated through a JOG operation to the designated positioning action address.	No	No	Yes	Set address → Learning → Jogging Jogging → Write ↑ / ↓ → Data set Write	76
Change current position	Changes the current position to the input value.	No	No	Yes	Select Axis menu → Change Present value input → Write	77
Decelera-tion stop	Decelerates to a stop for axes selected under the Axis menu.	No	No	Yes	Select Axis menu → Decelera-tion stop	78
Emergency Stop	Immediately stops the axes selected in Axis mode.	No	No	Yes	Any dis-play → Immediate stop	78
Setting OUT1 and OUT2 Outputs	Outputs OUT1 and OUT2.	No	No	Yes	Select OUT menu → Select OUT1/OUT2 menu → ON/OFF (OUT1, OUT2)	78
Writing PCU data to EEPROM and reading PCU data from EEPROM	Writes positioning actions, parameters, and speeds to the EEPROM and reads these values from the EEPROM.	No	No	Yes	Select FUN menu → Select EEPROM (Memory clear, servo, EEPROM) Select READ/ WRITE menu → Set	79 79
Error displays	Displays the contents of the PCU's error.	No	Yes	Yes	Select FUN menu An error message is automatically displayed when an error occurs.	80
Resetting	The PCU's error is reset.	Yes	Yes	Yes	Error results → Error reset	80

Operation name	Function	Available mode			Basic operating procedure	Page
		DEBUG	MONITOR	PROGRAM		
PC protect	PC and external inputs are protected.	Yes	No	No	Select mode → Select DEBUG mode (PCP, EXP, trace) → ON/OFF	81
Command tracing	The I/O statuses of the X and Y axes and the OP code are displayed.	Yes	No	No	Select mode → Select DEBUG mode (PCP, EXP) → ↓ - - -> ↓	82
Servomotor free	Sets a designated axis to servomotor lock or servomotor free.	No	No	Yes	Select mode → Servo selected (Memory clear, servo EEPROM) → Select Axis menu (X, Y) → Select servomotor (Free, lock) → Set	83

3G2A5-NC111-EV1

Operation name	Function	Basic operating procedure	Page
PCU data all clear	Clears the PCU data contents.	Clear → . → +/− → Shift → Del Ins	29
Writing PCU data	Writes PCU data.	Reading PCU data → Input PCU data → Write	86 to 89
Reading PCU data	Reads PCU data. Addresses of positioning actions can also be specified to be read.	PRMTR → ↑ SPEED → ↓ ADR ADR → Address set → SRCH	90 to 91
Inserting positioning actions	Writes a positioning action to a designated address and moves the prior positioning actions written at and beyond that address successively back one address each.	Reading PCU data → Input PCU data → Del Ins (Positioning action)	92

Operation name	Function	Basic operating procedure	Page
Deleting positioning actions	Deletes the positioning action at a designated address and shifts prior positioning actions past that address successively up toward the designated address.	Reading PCU data → Shift / Del Ins → Shift / Del Ins (Positioning action)	93
Origin search	Moves an axis to the origin.	CLR → ORIG SRCH	98
Origin return	Returns axis to origin from any position.	CLR → ORIG RETRN	98
Step execution	Runs program at designated address.	Reading PCU data → STEP EXEC	98
Manual operation	Executes manual low-speed and manual high-speed operation.	CLR → HIGH SPEED → ▶ / ◀	99
Teaching	Writes the present values to the designated positioning action address.	Reading PCU data → Manual low-speed operation / Manual high-speed operation → PATT → / SPEED → → TEACH → Set completion code — SPEED → Set speed → Del Ins / TEACH → Set speed → TEACH	99
Emergency stop	Stops immediately during positioning.	Step execution → EMERG Manual operation	100
Error displays	Displays the contents of the PCU's error.	Error code display → ↓ (When there is an interpolation error code)	101

SECTION 5
Reading and Writing C500-NC222-E Data

This section explains the operations involved in reading, writing, inserting, and deleting PCU data for C500-NC222-E Position Control Units.

⚠️ **Caution**   Confirm that no adverse effect will occurin the system before changing any set value in memory.

⚠️ **Caution**   Confirm that the set parameters operate correctly.

5-1 Writing PCU Data

This section explains the general operation involved in writing data. The subsequent sections provide examples of specific operations for writing PCU data and parameters.

Note All the data writing examples are explained in terms of the X axis. The procedures are the same for the Y axis.

This operation writes PCU data to the Position Control Unit. Writing data becomes possible after an address has been set or data has been read.

A single item of positioning data can be written to one address.

When modifying data that has been entered, press the CLR Key to clear the display before entering the new data.

For details regarding the setting ranges for PCU data, refer to *5-14 PCU Data and Setting Ranges*.

Note Before inputting new data, be sure to clear all the previous data. Refer to *4-5 Deleting Data From a C500-NC222-E PCU*.

1, 2, 3...   1. Select the axis and set the address.

```
X MODE SELECTED
AD      200
                        _
```

2. Press the Down Arrow Key.

   The beginning data will be displayed.

```
[↓]   AD-200 POS
            0P
                        _
```

3. Input the data.

   If the wrong data is input, press the CLR Key and input the data again.

```
[1] [2] [3]   AD-200 POS
                   123P
                        _
```

4. Press the WRITE Key.

```
[WRITE]   AD-200 SPD
          AD       0
                        _
```

5. Continue repeating steps 3 and 4 until all the data has been written.

5-2 Writing Positioning Actions Without Interpolation

The positioning action addresses are 100 to 399 for the X axis, and 500 to 799 for the Y axis. The method for writing positioning actions without interpolation is explained here.

The following table shows the settings used in this example.

Address	Data	
200	Positioning action	−77777777
	Speed address	01
	M code	99
	Dwell time address	2
	Acceleration and deceleration address	2
	Positioning action type	ABS
	Completion code	1
	Positioning enabled/disabled	Enabled
	Synchronization start enabled/disabled	Disabled

1, 2, 3...   1. Select the axis and set the address as 200.

```
X MODE SELECTED
AD     200          _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-200 POS
        0P          _
```

3. Next, perform the key inputs shown below.

[7]   [7]
```
AD-200 POS
     77777777P      _
```

Press [7] eight times.

[+/−]
```
AD-200 POS
   - 77777777P      _
```

[WRITE]
```
AD-200 SPD
AD      0           _
```

[1]
```
AD-200 SPD
AD      1           _
```

[WRITE]
```
AD-200 M-CODE
        0           _
```

[9] [9]
```
AD-200 M-CODE
        99          _
```

[WRITE]
```
AD-200 DWELTIME
AD      0           _
```

[2]
```
AD-200 DWELTIME
AD      2           _
```

[WRITE]
```
AD-200 ACC/DEC
PTN     0           _
```

[2]
```
AD-200 ACC/DEC
PTN     2           _
```

[WRITE]
```
AD-200 POS
TYPE    ABS         _
```

[WRITE]
```
AD-200 INTERPOL
0:NO 1:YES  0       _
```

[WRITE]
```
AD-200 POS
PTN     0           _
```

[1]
```
AD-200 POS
PTN     1           _
```

[WRITE]
```
AD-200 POS
0:NOP  1:OP 0       _
```
(See note.)

[1]
```
AD-200 POS
0:NOP   1:OP 1      _
```

[WRITE]
```
AD-200 SYNC-STA
0:NOP   1:OP 0      _
```

[WRITE]
```
AD-201 POS
        0P          _
```

Note   If positioning data is disabled, that positioning action will be treated as NOP (no operation), and it will not be used for positioning.

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5-3 Writing Positioning Actions With Linear Interpolation

The positioning action addresses are 100 to 399 for the X axis, and 500 to 799 for the Y axis. For positioning actions with linear interpolation, data can be enabled or disabled for either the X or Y axis. When a data item is disabled, it will be ignored even if the data is written. The following table shows the enabled/disabled status of the various data items for each axis.

For the Y axis it is only necessary to set the positioning action and positioning data type.

Y axis addresses are the same as the corresponding X axis addresses +400.

Field	Positioning action of X axis	Positioning action of Y axis
Positioning action	Enabled	Enabled
Speed address	Enabled	Disabled
M code	Enabled	Disabled
Dwell time address	Enabled	Disabled
Acceleration and deceleration data address	Enabled	Disabled
Positioning data type	Enabled	Enabled
Completion code	Enabled	Disabled

When writing linear interpolation data for an X-axis address, write the data for the corresponding Y-axis address too.

If the settings for the X and Y axes are different, an error will be generated when axis operation is started.

The enable/disable setting for synchronized operation is not available for positioning actions with interpolation.

Example

The following example shows how to write positioning actions with linear interpolation.
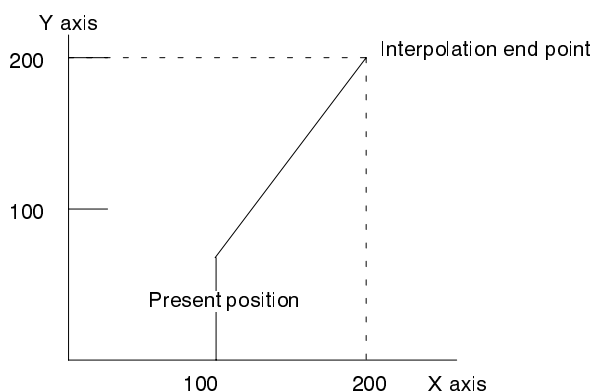
X-axis address	Data		Y-axis address	Data	
200	Positioning action	200	600	Positioning action	200
	Speed address	01		Speed address	---
	M code	22		M code	---
	Dwell time address	1		Dwell time address	---
	Accel/deceleration pattern address	1		Accel/deceleration pattern address	---
	Positioning data type	ABS		Positioning data type	ABS
	Completion code	0		Completion code	---
	Interpolation data	Interpolation end point		Interpolation data	Interpolation end point

Procedure   Use the following example procedure to write positioning actions with linear interpolation.

1, 2, 3...   1. Select the axis and set the address as 200.

```
X MODE SELECTED
AD      200
                    _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

```
AD-200 POS
          0P
                    _
```

3. Next, perform the key inputs shown below.

[2] [0] [0]
```
AD-200 POS
        200P
                    _
```

[WRITE]
```
AD-200 SPD
AD       0
                    _
```

[1]
```
AD-200 SPD
AD       1
                    _
```

[WRITE]
```
AD-200 M-CODE
        0
                    _
```

[2] [2]
```
AD-200 M-CODE
        22
                    _
```

[WRITE]
```
AD-200 DWELTIME
AD       0
                    _
```

[1]
```
AD-200 DWELTIME
AD       1
                    _
```

[WRITE]
```
AD-200 ACC/DEC
PTN      0
                    _
```

[1]
```
AD-200 ACC/DEC
PTN      1
                    _
```

[WRITE]
```
AD-200 POS
TYPE     ABS
                    _
```

[WRITE]
```
AD-200 INTERPOL
0:NO 1:YES   0
                    _
```

[1]
```
AD-200 INTERPOL
0:NO 1:YES   1
                    _
```

[WRITE]
```
AD-200 INTERPOL
0:END 1:CIRC 0
                    _
```

[WRITE]
```
AD-200 POS
PTN      0
                    _
```

[WRITE]
```
AD-200 POS
0:NOP  1:OP 0
                    _
```

[1]
```
AD-200 POS
0:NOP  1:OP 1
                    _
```

[WRITE]
```
AD-200 POS
          0P
                    _
```
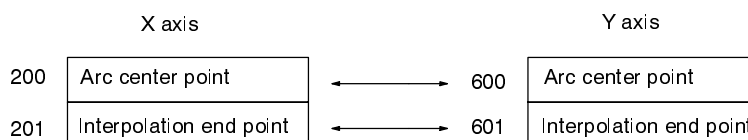
5-4   Writing Positioning Actions With Circular-arc Interpolation

The positioning action addresses are 100 to 399 for the X axis, and 500 to 799 for the Y axis.

There are two ways to designate positioning actions with circular-arc positioning. One is to specify the arc center point, and the other is to specify the arc intermediate point.

For specifying the arc center point, the arc intermediate point, and the interpolation end point, the Y axis addresses are the same as the corresponding X axis addresses +400.

When specifying the data, specify the arc center point or the arc intermediate point before the interpolation end point.


For positioning actions with circular-arc interpolation, data can be enabled or disabled for either the X or Y axis. When a data item is disabled, it will be ignored even if the data is written. The following table shows the enabled/disabled status of the various data items for each axis.

Field	X-axis positioning action			Y-axis positioning action		
	Arc center	Arc intermediate point	Interpolated end point	Arc center	Arc intermediate point	Interpolated end point
Positioning action	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Speed address	Enabled	Enabled	Disabled	Disabled	Disabled	Disabled
M code	Disabled	Disabled	Enabled	Disabled	Disabled	Disabled
Dwell time address	Disabled	Disabled	Enabled	Disabled	Disabled	Disabled
Acceleration and deceleration data address	Enabled	Enabled	Disabled	Disabled	Disabled	Disabled
Positioning data type (ABS/INC)	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Completion code (Pattern 0/1)	Enabled	Enabled	Disabled	Disabled	Disabled	Disabled
Arc direction (CW/CCW)	Enabled	Disabled	Disabled	Disabled	Disabled	Disabled

Example   The following example shows how to write positioning actions with circular-arc interpolation.
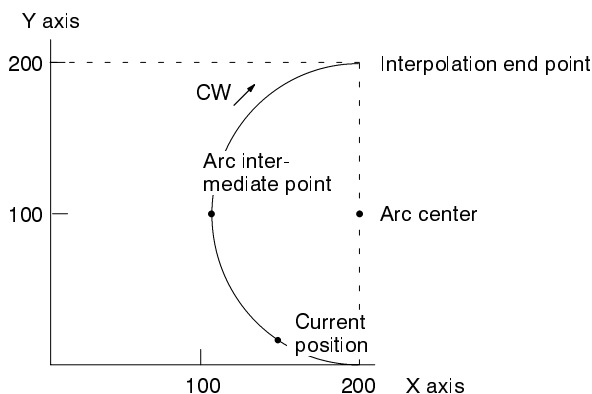
The following tables show the example settings. (The procedure in this example is explained in terms specifying the arc center point.) In these tables, "---" indicates that the data item is disabled.

When Arc Center Point is Specified

Kind of data	X-axis address	Field		Y-axis address	Field	
Arc center point	200	Positioning action	200	600	Positioning action	100
		Speed address	01		Speed address	---
		M code	---		M code	---
		Dwell time address	---		Dwell time address	---
		Accel/deceleration pattern address	1		Accel/deceleration pattern address	---
		Positioning data type	ABS		Positioning data type	ABS
		Completion code	0		Completion code	---
		Interpolation data	Arc center point		Interpolation data	---
		Arc direction	CW		Arc direction	CW
Interpolation end point	201	Positioning action	200	601	Positioning action	200
		Speed address	---		Speed address	---
		M code	22		M code	---
		Dwell time address	1		Dwell time address	---
		Accel/deceleration pattern address	---		Accel/deceleration pattern address	---
		Positioning data type	ABS		Positioning data type	INC
		Completion code	---		Completion code	---
		Interpolation data	Interpolation end pt.		Interpolation data	---

When Arc Intermediate Point is Specified

Kind of data	X-axis address	Field		Y-axis address	Field	
Arc intermediate point	200	Positioning action	100	600	Positioning action	100
		Speed address	02		Speed address	---
		M code	---		M code	---
		Dwell time address	---		Dwell time address	---
		Accel/deceleration pattern address	1		Accel/deceleration pattern address	---
		Positioning action type	ABS		Positioning action type	ABS
		Completion code	0		Completion code	---
		Interpolation data	Arc intermediate pt.		Interpolation data	---
Interpolation end point	201	Positioning action	200	601	Positioning action	200
		Speed address	---		Speed address	---
		M code	22		M code	---
		Dwell time address	1		Dwell time address	---
		Accel/deceleration pattern address	---		Accel/deceleration pattern address	---
		Positioning action type	ABS		Positioning action type	ABS
		Completion code	---		Completion code	---
		Interpolation data	interpolation end pt.		Interpolation data	---

Procedure   **Writing Positioning Actions With Circular-arc Interpolation**

1, 2, 3...   1. Select the X axis, and set the address as 200.

```
X MODE SELECTED
AD      200
                    _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-200 POS
        0P
                    _
```

3. Next, perform the key inputs shown below.

   Setting the immediate point the specified circular-arc for X-axis address 200.

[2] [0] [0]
```
AD-200 POS
      200P
                    _
```

[WRITE]
```
AD-200 SPD
AD        0
                    _
```

[1]
```
AD-200 M-CODE
AD        1
                    _
```

[WRITE]
```
AD-200 M-CODE
        0
                    _
```

[↓]
```
AD-200 DWELTIME
AD        0
                    _
```

[↓]
```
AD-200 ACC/DEC
PTN      0
                    _
```

[1]
```
AD-200 ACC/DEC
PTN      1
                    _
```

[WRITE]
```
AD-200 POS
TYPE      0
                    _
```

[↓]
```
AD-200 POS
TYPE     ABS
                    _
```

[↓]
```
AD-200 INTERPOL
0:NO 1:YES  0
                    _
```

[1]
```
AD-200 INTERPOL
0:NO 1:YES  1
                    _
```

[WRITE]
```
AD-200 INTERPOL
0:END 1:CIRC 0
                    _
```

[1]
```
AD-200 INTERPOL
0:END 1:CIRC 1
                    _
```

[WRITE]
```
AD-200 CIRC POS
0:MID 1:CENTER0
                    _
```

[1]
```
AD-200 CIRC POS
0:MID 1:CENTER1
                    _
```

[WRITE]
```
AD-200 COURCE
0:CW 1:CCW  0
                    _
```

[WRITE]
```
AD-200 POS
PTN       0
                    _
```

[WRITE]
```
AD-200 POS
0:NOP  1:OP 0
                    _
```

[1]
```
AD-200 POS
0:NOP  1:OP 1
                    _
```

Setting the end point for the specified circular-arc interpolation for X-axis address 201.

Key	Display
WRITE	AD-201 POS 0P
2 0 0	AD-201 POS 200P
WRITE	AD-201 SPD AD 0
↓	AD-201 MCODE AD 0
2 2	AD-201 M-CODE 22
WRITE	AD-201 DWELTIME AD 0
1	AD-201 DWELTIME AD 1
WRITE	AD-201 ACC/DEC PTN 0
↓	AD-201 POS TYPE ABS
WRITE	AD-201 INTERPOL 0:NO 1:YES 0
1	AD-201 INTERPOL 0:NO 1:YES 1
WRITE	AD-201 INTERPOL 0:END 1:CIRC 0
WRITE	AD-201 POS PTN 0
WRITE	AD-201 POS 0:NOP 1:OP 0
1	AD-201 POS 0:NOP 1:OP 1
WRITE	AD-202 POS 0P

5-5 Writing Parameters

The parameter addresses are 400 to 420 for the X axis, and 800 to 820 for the Y axis. The data can be written after addresses have been set or data has been read.

When modifying data that has been entered, press the CLR Key to clear the display before entering the new data.

The following parameter data can be set in units of pulses, mm, or inches.

• Stroke limit (+)
• Stroke limit (−)
• Home shift
• Maximum speed
• Teaching Box speed
• Origin compensation
• Origin search high speed

• Origin search low speed

• Number of deceleration stop pulses

The settings for zones, backlash compensation, in-position, and the deviation counter can only be made in pulses.

In this manual, the examples are explained using pulses as the unit.

• The following displays will appear for positioning actions if mm or inches is selected as the unit.

MM
```
+10000.000M
```

INCH
```
+1000.0000I
```

• The following displays will appear for speeds if mm or inches is selected as the unit.

MM
```
1000.000MS
```

INCH
```
100.0000IS
```

Note When data is read, overflow data causes the following display.

```
OVER M
```

```
OVER I
```

Example

The following example shows how to write parameter data.

Address	Data	
400	Unit setting	pulse
401	Pulse rate	1
402	Rotation direction	+
403	Encoder type	–, –, x4
404	Gain	24
405	In-position	10
406	Backlash compensation	100
407	Stroke limit (+)	9,999
408	Stroke limit (–)	9,999
409	Zone setting	100, 100
410	Home shift	1,000
411	Maximum speed, speed coefficient	10,000, 5
412	Teaching Box speed	1,000, 1, 1
413	Search direction	0
414	Origin compensation	10
415	High origin search speed	2,000
416	Origin search acceleration and deceleration	1
417	Low origin search speed	1,000
418	External deceleration stop	1, 100, 1
419	Wiring check	1, 10, 100
420	Error counter capacity	0, 0, 512

Procedure   **Writing Parameter Data**

1, 2, 3...   1. Select the X axis, and set the address as 400.

```
X MODE SELECTED
AD      400          _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-400 X-UNIT
PULSE MM INCH
```

3. Next, perform the key inputs shown below.

[SET]
```
AD-401 X-PULSE
RATE   0.0000       _
```

[CLR]
```
AD-401 X-PULSE
RATE       0        _
```

[1]
```
AD-401 X-PULSE
RATE       1        _
```

[WRITE]
```
AD-402 X-MOTOR
DIR+ VOLT   +       _
```

[SET]
```
AD-403 X-ENCDR
Z LOGIC     +       _
```

[+/−]
```
AD-403 X-ENCDR
Z LOGIC     -       _
```

[SET]
```
AD-403 X-FBACK
X1  X2  X4     _
```

[SET]
```
AD-403 X-ENCDR
AB CHANGE   +       _
```

[+/−]
```
AD-403 X-ENCDR
AB CHANGE   -       _
```

[SET]
```
AD-404 X-GAIN
         0          _
```

[2][4]
```
AD-404 X-GAIN
        24          _
```

[WRITE]
```
AD-405 X-
IN POS     0P       _
```

[1][0]
```
AD-405 X-
IN POS    10P       _
```

[WRITE]
```
AD-406 X-
BACKLASH    0P      _
```

[1][0][0]
```
AD-406 X-
BACKLASH  100P      _
```

[WRITE]
```
AD-407 X-STROKE
+MAX       0P       _
```

[9][9][9][9]
```
AD-407 X-STROKE
+MAX    9999P       _
```

[WRITE]
```
AD-408 X-STROKE
-MAX       0P       _
```

[9][9][9][9]
```
AD-408 X-STROKE
-MAX    9999P       _
```

[WRITE]
```
AD-409 X-ACC
ZONE       0P       _
```

Keys	Display
1 0 0	AD-409 X-ACC ZONE 100P _
WRITE	AD-409 X-DEC ZONE 0P _
1 0 0	AD-409 X-DEC ZONE 100P _
WRITE	AD-410 X-HOME SFT 0P _
1 0 0 0	AD-410 X-HOME SFT 1000P _
WRITE	AD-411 X-MAXSPD 0PS _
1 0 0 0 0	AD-411 X-MAXSPD 10000PS _
WRITE	AD-411 X-T.BOX SPD FACTOR 0 _
5	AD-411 X-T.BOX SPD FACTOR 5 _
WRITE	AD-412 X-T.BOX JOGSP 0PS _
1 0 0 0	AD-412 X-T.BOX JOGSP 1000PS _
WRITE	AD-412 X-T.BOX JOG-DEC 0 _
1	AD-412 X-T.BOX JOG-DEC 1 _
WRITE	AD-412 X-T.BOX PULSE 0 _
1	AD-412 X-T.BOX PULSE 1 _
WRITE	AD-413 X-ORG SRCH DIR 0 _
WRITE	AD-414 X-ORG CORR 0P _
1 0	AD-414 X-ORG CORR 10P _
WRITE	AD-415 X-SRCH H SPD 0PS _
2 0 0 0	AD-415 X-SRCH H SPD 2000PS _
WRITE	AD-416 X-ORG SRCH ACC/DEC 0 _
1	AD-416 X-ORG SRCH ACC/DEC 1 _
WRITE	AD-417 X-SRCH L SPD 0PS _
1 0 0 0	AD-417 X-SRCH L SPD 1000PS _

WRITE	AD-418 X-DEC PTN 0 _
1	AD-418 X-DEC PTN 1 _
WRITE	AD-418 X-DEC STOP 0P _
1 0 0	AD-418 X-DEC STOP 100P _
WRITE	AD-418 X-T.BOX DEC PTN 0 _
1	AD-418 X-T.BOX DEC PTN 1 _
WRITE	AD-419 X-CHECK TIME 0 PULSE 0
1 0	AD-419 X-CHECK TIME10 PULSE 0
WRITE	AD-419 X-CHECK TIME10 PULSE 0 _
1 0 0	AD-419 X-CHECK TIME10 PULSE100 _
WRITE	AD-419 X-OPEN CHECK OP NOP _
←	AD-419 X-OPEN CHECK OP NOP_
WRITE	AD-420 X-ERR OUT1 OFF _
ON/OFF	AD-420 X-ERR OUT1 ON _
WRITE	AD-420 X-SERVO OUT2 OFF _
ON/OFF	AD-420 X-SERVO OUT2 ON _
WRITE	AD-420 X-ERR CAPA 32768P _
CLR	AD-420 X-ERR CAPA 0P _
5 1 2	AD-420 X-ERR CAPA 512P _
WRITE	AD-450 X-DWEL TIME 0 _

5-6 Writing Speeds

The addresses for speeds are 900 to 999.

Example

The following example shows how to write speeds.

Address	Data	
900	Speed	1
901	Speed	10
902	Speed	100
903	Speed	1,000

1, 2, 3...   1. Select the X axis, and set the address as 900.

```
X MODE SELECTED
AD      900
                     _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-900 SPD
     0PS
                  _
```

3. Next, perform the key inputs shown below.

[1]
```
AD-900 SPD
     1PS
                  _
```

[WRITE]
```
AD-901 SPD
     0PS
                  _
```

[1][0]
```
AD-901 SPD
    10PS
                  _
```

[WRITE]
```
AD-902 SPD
     0PS
                  _
```

[1][0][0]
```
AD-902 SPD
   100PS
                  _
```

[WRITE]
```
AD-903 SPD
     0PS
                  _
```

[1][0][0][0]
```
AD-903 SPD
  1000PS
                  _
```

[WRITE]
```
AD-904 SPD
     0PS
                  _
```

5-7 Writing Dwell Times

The addresses for dwell times are 450 to 459 for the X axis, and 850 to 859 for the Y axis.

Dwell times are set in units of 10 ms. Thus, for example, inputting a value of 10 sets a dwell time of 100 ms.

Example

The following example shows how to write dwell times.

Address	Data	
450	Dwell time 0	100 ms
451	Dwell time 1	200 ms
452	Dwell time 2	300 ms

1, 2, 3... 1. Select the X axis, and set the address as 450.

```
X MODE SELECTED
AD      450
                        _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-450 X-DWEL
TIME      0
                  _
```

3. Next, perform the key inputs shown below.

[1] [0]
```
AD-450 X-DWEL
TIME      10
                  _
```

[WRITE]
```
AD-451 X-DWEL
TIME      0
                  _
```

[2] [0]
```
AD-451 X-DWEL
TIME      20
                  _
```

[WRITE]
```
AD-452 X-DWEL
TIME      0
                  _
```

[3] [0]
```
AD-452 X-DWEL
TIME      30
                  _
```

[WRITE]
```
AD-453 X-DWEL
TIME      0
                  _
```

5-8   Writing Acceleration and Deceleration Times

The addresses for acceleration and deceleration time patterns are 460 to 469 for the X axis, and 860 to 869 for the Y axis.

The times are set in units of 10 ms. Thus, for example, inputting a value of 10 sets a time of 100 ms.

Example   The following example shows how to write acceleration and deceleration times.

Address	Data
460	Acceleration and deceleration time #0, 100-ms acceleration, and 100-ms deceleration
461	Acceleration and deceleration time #1, 200-ms acceleration, and 100-ms deceleration
462	Acceleration and deceleration time #2, 300-ms acceleration, and 100-ms deceleration

1, 2, 3...   1. Select the X axis, and set the address as 460.

```
X MODE SELECTED
AD      460           _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-460 X-ACC
PTN DATA    0        _
```

3. Next, perform the key inputs shown below.

[1][0]
```
AD-460 X-ACC
PTN DATA   10        _
```

[WRITE]
```
AD-460 X-DEC
PTN DATA    0        _
```

[1][0]
```
AD-460 X-DEC
PTN DATA   10        _
```

[WRITE]
```
AD-461 X-ACC
PTN DATA    0        _
```

[2][0]
```
AD-461 X-ACC
PTN DATA   20        _
```

[WRITE]
```
AD-461 X-DEC
PTN DATA    0        _
```

[1][0]
```
AD-461 X-DEC
PTN DATA   10        _
```

[WRITE]
```
AD-462 X-ACC
PTN DATA    0        _
```

[3][0]
```
AD-462 X-ACC
PTN DATA   30        _
```

[WRITE]
```
AD-462 X-DEC
PTN DATA    0        _
```

[1][0]
```
AD-462 X-DEC
PTN DATA   10        _
```

[WRITE]
```
AD-463 X-ACC
PTN DATA    0        _
```

5-9   Writing Synchronous Positioning Actions

The addresses for synchronous positioning actions are 470 to 479 for the X axis, and 870 to 879 for the Y axis.

Example

The following example shows how to write synchronous positioning actions.

Address	Data	
470	Data type	ABS
	Synchronization position	−5500
	Y axis address	575
	Synchronization pattern	SER
	Next address designation	5
	Synchronous positioning action enabled/disabled	1

1, 2, 3...   1. Select the X axis, and set the address as 470.

```
X MODE SELECTED
AD      470          _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-470 DATA
TYPE     ABS         _
```

3. Next, perform the key inputs shown below.

[SET]
```
AD-470 SYNC
POS      0P          _
```

[5][5][0][0]
```
AD-470 SYNC
POS    5500P         _
```

[+/−]
```
AD-470 SYNC
POS    5500P         _
```

[WRITE]
```
AD-470 Y-AXIS
AD      500          _
```

[5][7][5]
```
AD-470 Y-AXIS
AD      575          _
```

[WRITE]
```
AD-470 PTN
SIN SER PAD  0
```

[→]
```
AD-470 PTN
SIN SER PAD  0
```

[SET]
```
AD-470 PTN
SIN SER PAD  0       _
```

[5]
```
AD-470 PTN
SIN SER PAD  5       _
```

[WRITE]
```
AD-470 START
0:NOP 1:OP   0       _
```

[1]
```
AD-470 START
0:NOP 1:OP   1       _
```

[WRITE]
```
AD-471 DATA
TYPE     ABS         _
```

5-10 Writing Zone Settings

The addresses for zone settings are 480 to 487 for the X axis, and 880 to 887 for the Y axis.

Example   The following example shows how to write zone settings.

Address	Data	
480	ON positioning action	−5500
	OFF positioning action	−7500
	Data enabled/disabled	1
	External output ON/OFF	1
	External output designation OUT1	ON
	External output designation OUT2	OFF

1, 2, 3...   1. Select the X axis, and set the address as 480.

```
X MODE SELECTED
AD      480          _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-480 ZONE ON
        0P           _
```

3. Next, perform the key inputs shown below.

[5][5][0][0]
```
AD-480 ZONE ON
     5500P           _
```

[+/−]
```
AD-480 ZONE ON
     5500P=          _
```

[WRITE]
```
AD-480 ZONE OFF
        0P           _
```

[7][5][0][0]
```
AD-480 ZONE OFF
     7500P           _
```

[+/−]
```
AD-480 ZONE OFF
     7500P=          _
```

[WRITE]
```
AD-480 DATA
0:NOP 1:OP   0       _
```

[1]
```
AD-480 DATA
0:NOP 1:OP   1       _
```

[WRITE]
```
AD-480 OUTPUT
0:NOP 1:OP   0       _
```

[1]
```
AD-480 OUTPUT
0:NOP 1:OP   1       _
```

[WRITE]
```
AD-480 OUT APPT
OUT1OFF OUT2OFF
```

[ON/OFF]
```
AD-480 OUT APPT
OUT1ON  OUT2OFF
```

[WRITE]
```
AD-480 OUT APPT
OUT1ON  OUT2OFF      _
```

[WRITE]
```
AD-481 ZONE ON
        0P           _
```

5-11 Reading PCU Data

This operation reads PCU data that has been written to the Position Control Unit. It is used for checking and modifying the data.

The procedure outlined here shows the general operation involved in reading PCU data. The following pages provide examples of specific operations.

Note All the data reading examples are explained in terms of the X axis. The procedures would be the same for the Y axis.

1, 2, 3... 1. Select the axis and set the address.

2. Press the Down Arrow Key. The beginning data for the specified address will be displayed. Then continue pressing the Down Arrow Key to display subsequent data.

```
↓   X MODE SELECTED
    AD      123            _

↓   AD-123 POS
       12345678P           _

↓   AD-123 SPD
    AD         1           _
```

To go back to a previous display, press the Up Arrow Key. Pressing the Up Arrow Key while the beginning data of an address is displayed will cause the last data in the previous address to be displayed. Likewise, pressing the Down Arrow while the last data of an address is displayed will cause the beginning data of the next address to be displayed.

5-11-1 Reading X-axis Positioning Actions Without Interpolation

In this example, the values shown in the following table have been written for the positioning action in address 123 on the X axis.

Address	Data	
123	Positioning action	+12345678
	Speed address	01
	M code	11
	Dwell time address	1
	Acceleration and deceleration address	1
	Positioning action type	ABS
	Completion code	0
	Positioning enabled/disabled	1
	Synchronization start enabled/disabled	0

1, 2, 3... 1. Select the X axis and set the address as 123.

```
    X MODE SELECTED
    AD      123            _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

```
↓   AD-123 POS
       12345678P           _
```

3. Next, perform the key inputs shown below.

```
↓   AD-123 SPD
    AD         1           _

↓   AD-123 M-CODE
          11               _

↓   AD-123 DWELTIME
    AD         1           _
```

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↓ | AD-123 ACC/DEC
PTN   1   _

↓ | AD-123 POS
TYPE   ABS   _

↓ | AD-123 INTERPOL
0:NO 1:YES   0   _

↓ | AD-123 POS
PTN   0   _

↓ | AD-123 POS
0:NOP   1:OP 1   _

↓ | AD-123 SYNC-STA
0:NOP   1:OP 0   _

↓ | AD-124 POS
      77777P   _

5-11-2 Reading X-axis Positioning Actions With Interpolation

In this example, the values shown in the following table have been written for the positioning actions in addresses 123 and 124 on the X axis.

Address	Data		Address	Data	
123	Positioning action	100	124	Positioning action	200
	Speed address	01		Speed address	---
	M code	---		M code	22
	Dwell time address	---		Dwell time address	1
	Acceleration and deceleration address	1		Acceleration and deceleration address	---
	Positioning action type	ABS		Positioning action type	ABS
	Interpolation data	Arc center point		Completion code	0
	Circular-arc direction	CW		Interpolation data	End point
	Completion code	---			

For positioning actions with interpolation, the interpolation attributes will be displayed. The interpolation end point, center point, or intermediate point will be indicated.

1, 2, 3... 1. Select the X axis and set the address as 123.

X MODE SELECTED
AD   123   _

2. Press the Down Arrow Key. The beginning data will be displayed.

↓ | AD-123 POS
C   100   _

The "C" indicates that this is the arc center point.

3. Next, perform the key inputs shown below.

↓ | AD-123 SPD
AD   1   _

↓ | AD-123 M-CODE
      0   _

↓ | AD-123 DWELTIME
AD   0   _

↓ | AD-123 ACC/DEC
PTN   1   _

↓ | AD-123 POS
TYPE   ABS   _

Arc Interpolation Data

↓ | AD-123 INTERPOL
0:NO 1:YES 1 _

↓ | AD-123 INTERPOL
0:END 1:CIRC 1 _

↓ | AD-123 CIRC POS
0:END 1:CENTER1 _

Indicates that this address is the arc center point.

↓ | AD-123 COURCE
0:CW 1:CCW 0 _

Indicates that the direction of rotation for the arc is CW.

↓ | AD-123 POS
PTN 0 _

↓ | AD-123 POS
0:NOP 1:OP 1 _

↓ | AD-124 POS
E 200P _

The "E" indicates that this is the interpolation end point.

↓ | AD-124 SPD
AD 0 _

↓ | AD-124 M-CODE
22 _

↓ | AD-124 DWELTIME
AD 1 _

↓ | AD-124 ACC/DEC
PTN 1 _

↓ | AD-124 POS
TYPE ABS _

↓ | AD-124 INTERPOL
0:NO 1:YES 1 _

↓ | AD-124 INTERPOL
0:END 1:CIRC 0 _

↓ | AD-124 POS
PTN 0 _

↓ | AD-124 POS
0:NOP 1:OP 1 _

↓ | AD-125 POS
0P _

Interpolation Data

The end-point display shows that the data in the current address is for linear or circular-arc interpolation.
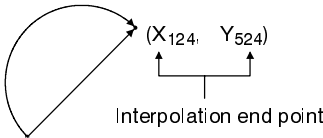
The intermediate-point and center-point displays show that the current address is for a positioning action using the intermediate point or center point.
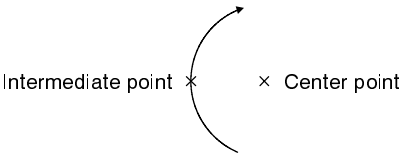
If the center point is used, the direction of arc rotation will be shown (CW or CCW).
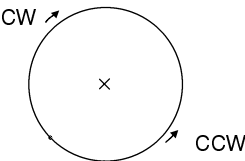
5-11-3 Reading X-axis Parameters

In this example, the values shown in the following table have been written for the parameters in addresses 405 to 409 on the X axis.

Address	Data	
405	In-position	100
406	Backlash compensation	100
407	Stroke limit (+)	99,999,999
408	Stroke limit (−)	99,999,999
409	Zone setting	9,999

1, 2, 3...   1. Select the X axis and set the address as 405.

```
X MODE SELECTED
AD      405            _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

```
AD-405 X-
IN POS    100P         _
```

3. Next, perform the key inputs shown below.

```
AD-406 X-
BACKLASH   100P        _
```

```
AD-407 X-STROKE
+MAX  99999999P        _
```

```
AD-408 X-STROKE
-MAX  99999999P        _
```

```
AD-409 X-ACC
ZONE      9999P        _
```

5-11-4 Reading Speeds

In this example, the values shown in the following table have been written for the speeds in addresses 900 to 904 on the X axis.

Address	Data	
900	Speed	1 pps
901	Speed	10 pps
902	Speed	100 pps
903	Speed	1,000 pps
904	Speed	10,000 pps

1, 2, 3...   1. Select the X axis, and set the address as 900.

```
X MODE SELECTED
AD      900
                    _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-900 SPD
    1PS
                    _
```

3. Next, perform the key inputs shown below.

[↓]
```
AD-901 SPD
    10PS
                    _
```

[↓]
```
AD-902 SPD
    100PS
                    _
```

[↓]
```
AD-903 SPD
    1000PS
                    _
```

[↓]
```
AD-904 SPD
    10000PS
                    _
```

5-11-5 Reading X-axis Dwell Times

In this example, the values shown in the following table have been written for the dwell times in addresses 450 to 452 on the X axis.

Address	Data	
450	Dwell time 0	10
451	Dwell time 1	20
452	Dwell time 2	30

1, 2, 3...   1. Select the X axis, and set the address as 450.

```
X MODE SELECTED
AD      450
                    _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

[↓]
```
AD-450 X-DWEL
TIME      10
                    _
```

3. Next, perform the key inputs shown below.

[↓]
```
AD-451 X-DWEL
TIME      20
                    _
```

[↓]
```
AD-452 X-DWEL
TIME      30
                    _
```

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5-11-6 Reading X-axis Acceleration and Deceleration Times

In this example, the values shown in the following table have been written for the acceleration and deceleration time patterns in addresses 460 to 462 on the X axis.

Address	Data
460	Acceleration and deceleration time #0: acceleration 10, and deceleration 40
461	Acceleration and deceleration time #1: acceleration 10, and deceleration 50
462	Acceleration and deceleration time #2: acceleration 10, and deceleration 60

1, 2, 3...   1. Select the X axis, and set the address as 460.

```
X MODE SELECTED
AD      460
                      _
```

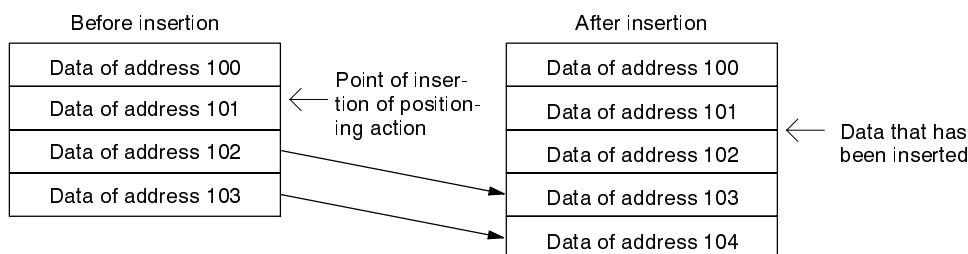2. Press the Down Arrow Key. The beginning data will be displayed.

```
[↓]   AD-460 X-ACC
      PTN DATA   10
                      _
```

3. Next, perform the key inputs shown below.

```
[↓]   AD-460 X-DEC
      PTN DATA   40
                      _
```

```
[↓]   AD-461 X-ACC
      PTN DATA   10
                      _
```

```
[↓]   AD-461 X-DEC
      PTN DATA   50
                      _
```

```
[↓]   AD-462 X-ACC
      PTN DATA   10
                      _
```

```
[↓]   AD-462 X-DEC
      PTN DATA   60
                      _
```

5-11-7 Reading X-axis Synchronous Positioning Actions

In this example, the values shown in the following table have been written for the synchronous positioning action in address 470 on the X axis.

Address	Data	
470	Data type	ABS
	Synchronization position	−55555555
	Y-axis address	575
	Synchronization pattern	SER
	Next address designation	5
	Synchronization positioning action enabled/disabled	1

1, 2, 3...   1. Select the X axis, and set the address as 470.

```
X MODE SELECTED
AD      470
                      _
```

2. Press the Down Arrow Key. The beginning data will be displayed.
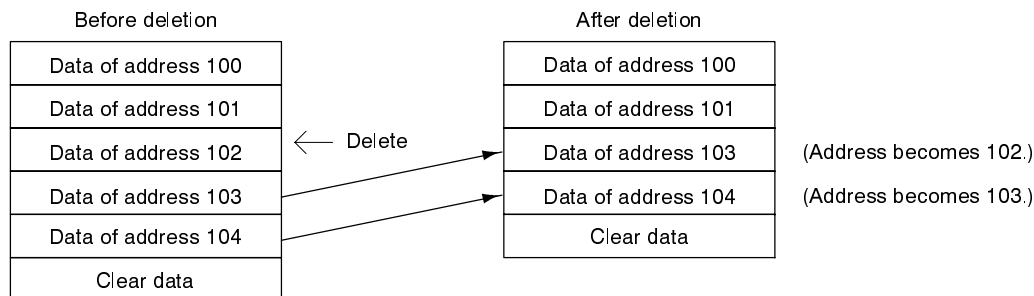
```
[↓]   AD-470 DATA
      TYPE      ABS
                      _
```

3. Next, perform the key inputs shown below.

↓	AD-470 SYNC POS -55555555P _

↓	AD-470 Y-AXIS AD 575 _

↓	AD-470 PTN SIN SER PAD 5

↓	AD-470 PTN SIN SER PAD 5 _

1	AD-470 START 0:NOP 1:OP 1 _

↓	AD-470 DATA TYPE ABS _

5-11-8 Reading X-axis Zone Settings

In this example, the values shown in the following table have been written for the zone setting in address 480 on the X axis.

Address	Data	
480	ON positioning action	−50000000P
	OFF positioning action	−70000000P
	Data enabled/disabled	1
	External output ON/OFF	1
	External output designation OUT1	ON
	External output designation OUT2	OFF

1, 2, 3...   1. Select the X axis, and set the address as 480.

X MODE SELECTED AD   480   _

2. Press the Down Arrow Key. The beginning data will be displayed.

↓	AD-480 ZONE ON -50000000P _

3. Next, perform the key inputs shown below.

↓	AD-480 ZONE OFF -70000000P _

↓	AD-480 DATA 0:NOP 1:OP 1 _

↓	AD-480 OUTPUT 0:NOP 1:OP 1 _

↓	AD-480 OUT APPT OUT1ON _OUT2OFF

↓	AD-480 OUT APPT OUT1ON OUT2OFF _

↓	AD-481 ZONE ON 0P _

5-12 Inserting Positioning Actions

This operation inserts a positioning action at a designated address, and shifts all subsequent positioning actions to the next address.

Before insertion
Data of address 100
Data of address 101
Data of address 102
Data of address 103

Point of insertion of positioning action

After insertion
Data of address 100
Data of address 101
Data of address 102
Data of address 103
Data of address 104

← Data that has been inserted

Note 1. A positioning action cannot be inserted if data has already been written to the last address for the positioning actions at that axis.

2. Parameters and speeds cannot be inserted.

3. The DEL/INS Key is valid only when the beginning address for a positioning action is displayed.

4. Positioning actions must be inserted separately for the X and Y axes. The Y-axis data cannot be changed simply by inserting a positioning action for the X axis.

Procedure   Use the following procedure to insert a positioning action.

1, 2, 3...   1. Select the X axis, and set the address as 102.

```
X MODE SELECTED
AD      102
                _
```

2. Press the Down Arrow Key. The beginning data will be displayed.

↓
```
AD-102 POS
   12345678P
                _
```

3. Press the DEL/INS Key followed by the Down Arrow Key.

DEL/INS ↓
```
AD-102 POS
       0P
                _
```

4. Use the procedures explained earlier in this section to write the positioning action data that has been inserted here.

5-13 Deleting Positioning Actions

This operation deletes a positioning action from a designated address. The subsequent positioning actions are shifted back to fill in the vacant address, and their addresses are each decremented by one.

Before deletion
Data of address 100
Data of address 101
Data of address 102
Data of address 103
Data of address 104
Clear data

← Delete

After deletion	
Data of address 100	
Data of address 101	
Data of address 103	(Address becomes 102.)
Data of address 104	(Address becomes 103.)
Clear data	

Note 1. Parameters and speeds cannot be deleted.

2. The SHIFT and DEL/INS Keys are valid only when the beginning address for a positioning action is displayed.

3. Positioning actions must be deleted separately for the X and Y axes. The Y-axis data cannot be changed simply by deleting a positioning action for the X axis.

Procedure   Use the following procedure to delete a positioning action. In this example, the positioning action at address 102 is deleted.

1, 2, 3...   1. Select the X axis, and set the address as 102.

> X MODE SELECTED
> AD   102   _

2. Press the Down Arrow Key. The beginning data will be displayed.

> [↓]   AD-102 POS
>   13500P   _

3. Press the SHIFT, DEL/INS, and Up Arrow Keys in order. The data that was in address 103 before deletion will now be displayed at address 102.

> [SHIFT] [DEL INS] [↑]   AD-102 POS
>   57000P   _

5-14 PCU Data and Setting Ranges

Item	Address range	Field		Permitted settings
Positioning actions	100	X-axis position		0 to 99,999,999 pulses
				0 to 99,999.000 mm
				0 to 9,999.0000 inches
		Speed		0 to 99
		M code, dwell time		0 to 99, 0 to 9
		Acceleration and deceleration time		0 to 9
		Positioning action type		ABS/INC
		Interpolation positioning action		0, 1 (1: yes; 0: no)
		Interpolation positioning action type		0, 1 (1: circular arc; 0: end point)
		Circular arc data type		0, 1 (1: intermediate point; 0: arc center)
		Circular arc direction		0, 1 (1:CW; 0:CCW)
		Completion code		0, 1 (1: continuous; 0: terminating)
		Position action enable/disable		0, 1 (1: enable; 0: disable)
	101 to 399	Same as above		Same as above
X-axis parameters	400	Unit		Pulse, mm, inch
	401	Pulse rate		0.0001 to 1.0
	402	Rotation direction		0, 1 (1: −; 0: +)
	403	Encoder type	Z-phase	+, −
			Multiple	x1, x2, x4
			A- and B-phase polarity change	+, −
	404	Gain		(1 to 999) x 10^{-2} x 305 μV/ms
	405	In-position zone		1 to 999 pulses
	406	Backlash compensation		0 to 9,999 pulses
	407	Stroke limit (+)		0 to 99,999,999 pulses
				0.000 to 99,999.00 mm
				0.0000 to 9,999.0000 inches
	408	Stroke limit (−)		0 to 99,999,999 pulses
				0.000 to 99,999.00 mm
				0.0000 to 9,999.0000 inches
	409	Zone setting		0 to 9,999 pulses

Item	Address range	Field	Permitted settings
X-axis parameters	410	Home shift	0 to ±999,999 pulses
			0 to ±99,999.0 mm
			0 to ±9,999.00 inches
	411	Maximum speed	1 to 300,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.000 inch/s
		Teaching Box speed coefficient	1 to 9
	412	Teaching Box jogging speed	1 to 300,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.0000 inch/s
		Teaching Box jogging acceleration and deceleration time	0 to 9
		Number of Teaching Box pulses	1 to 9 pulses
	413	Origin search direction	0, 1 (1: –; 0: +)
	414	Origin compensation	0 to ±999,999 pulses
			0 to ±99,999.0 mm
			0 to ±9,999.00 inches
	415	High origin search speed	1 to 300,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.0000 inch/s
	416	Origin search acceleration and deceleration	0 to 9
	417	Low origin search speed	1 to 10,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.0000 inch/s
	418	External deceleration-stop pattern	0 to 9
		Number of deceleration-stop pulses	1 to 10,000 pulses
			0.001 to 9,999.000 mm
			0.0001 to 999.0000 inches
		Deceleration key deceleration pattern	0 to 9
	419	Disconnection check	0, 1 (1:yes; 0: no)
		Check time	0 to 99
		Number of check pulses	0 to 999 pulses
	420	Error counter capacity	10 to 32,768 pulses
		External output designation	0, 1 (1: ON; 0: OFF)
Dwell times	450	X-axis dwell time #0	0 to 9990
	451 to 459	X-axis dwell times #1 to #9	0 to 9990
Acceleration and deceleration times	460	X-axis acceleration and deceleration time #0	1 to 499 ms
	461 to 469	X-axis acceleration and deceleration times #1 to #9	1 to 499 ms
X-axis synchronous positioning actions	470	X-axis synchronous positioning action	0 to ±99,999,999 pulses
			0 to ±99,999.000 mm
			0 to ±9,999.0000 inches
		Y-axis start address	500 to 799
		Synchronization pattern	0, 1 (1: continuous; 0: single)
		Continuous pattern next address	0 to 9
		Data type	ABS/INC
		Data enable/disable	0, 1 (1: enable; 0: disable)

Item	Address range	Field		Permitted settings
X-axis synchronous positioning actions	471 to 479	Same as above		Same as above
X-axis zone setting	480	X-axis zone ON data		0 to ±99,999,999 pulses
				0 to ±99,999.000 mm
				0 to ±9,999.0000 inches
		X-axis zone OFF data		0 to ±99,999,999 pulses
				0 to ±99,999.000 mm
				0 to ±9,999.0000 inches
		Data enable/disable		0, 1 (1: enable; 0: disable)
		External output ON/OFF		0, 1 (1: yes; 0: no)
		External output designation OUT1		0, 1 (1: designated; 0: not designated)
		External output designation OUT2		0, 1 (1: designated; 0: not designated)
	481 to 487	Same as above		Same as above
Positioning actions	500	Y-axis position		0 to 99,999,999 pulses
				0 to 99,999.000 mm
				0 to 9,999.0000 inches
		Speed		0 to 99
		M code, dwell time		0 to 99, 0 to 9
		Acceleration and deceleration time		0 to 9
		Positioning action type		ABS/INC
		Interpolation positioning action		0, 1 (1: yes; 0: no)
		Interpolation positioning action type		0, 1 (1: circular arc; 0: end point)
		Circular arc data type		0, 1 (1: intermediate point; 0: circular arc center)
		Circular arc direction		0, 1 (1:CW; 0:CCW)
		Completion code		0, 1 (1: continuous; 0: terminating)
		Positioning action enabled/disable		0, 1 (1: enable; 0: disable)
	501 to 799	Same as above		Same as above
Y-axis parameters	800	Unit		Pulse, mm, inch
	801	Pulse rate		0.0001 to 1.0
	802	Rotation direction		0, 1 (1: −; 0: +)
	803	Encoder type	Z-phase	+, −
			Multiple	x1, x2, x4
			A- and B-phase polarity change	+, −
	804	Gain		(1 to 999) x 10^{-2} x 305 μV/ms
	805	In-position zone		1 to 999 pulses
	806	Backlash compensation		0 to 9,999 pulses
	807	Stroke limit (+)		0 to 99,999,999 pulses
				0.000 to 99,999.000 mm
				0.0000 to 9,999.0000 inches
	808	Stroke limit (−)		0 to 99,999,999 pulses
				0.000 to 99,999.000 mm
				0.0000 to 9,999.0000 inches
	809	Zone setting		0 to 9,999 pulses
	810	Home shift		0 to ±999,999 pulses
				0 to ±99,999.0 mm
				0 to ±9,999.00 inches

Item	Address range	Field	Permitted settings
Y-axis parameters	811	Maximum speed	1 to 300,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.0000 inch/s
		Teaching Box speed coefficient	1 to 9
	812	Teaching Box jogging speed	1 to 300,000 pps
			0.001 to 999.000 mm/s
			0.0001 to 999.0000 inch/s
		Teaching Box jogging acceleration and deceleration time	0 to 9
		Number of Teaching Box pulses	1 to 9 pulses
	813	Origin search direction	0, 1 (1: −; 0: +)
	814	Origin compensation	0 to ±999,999 pulses
			0 to ±99,999.0 mm
			0 to ±9,999.00 inches
	815	High origin search speed	1 to 300,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.0000 inch/s
	816	Origin search acceleration and deceleration	0 to 9
	817	Low origin search speed	1 to 10,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.0000 inch/s
	818	External deceleration-stop pattern	0 to 9
		Number of deceleration-stop pulses	1 to 10,000 pulses
			0.001 to 9,999.000 mm
			0.0001 to 999.0000 inches
		Deceleration key deceleration pattern	0 to 9
	819	Disconnection check	0, 1 (1: yes; 0: no)
		Check time	0 to 99
		Number of check pulses	0 to 999 pulses
	820	Error counter capacity	10 to 32,768 pulses
		External output designation	0, 1 (1: ON; 0: OFF)
Dwell times	850	Y-axis dwell time #0	0 to 9,990 ms
	851 to 859	Y-axis dwell times #1 to #9	0 to 9,990 ms
Acceleration and deceleration times	860	Y-axis acceleration and deceleration time #0	1 to 499 ms
	861 to 869	Y-axis acceleration and deceleration times #1 to #9	1 to 499 ms
Y-axis synchronous positioning actions	870	Y-axis synchronous positioning action	0 to ±99,999,999 pulses
			0 to ±99,999.000 mm
			0 to ±9,999.0000 inches
		X-axis start address	100 to 399
		Synchronization pattern	0, 1
		Continuous pattern next address	0 to 9
		Data type	ABS/INC
		Data enabled/disabled	0, 1 (1: enabled; 0: disabled)
	871 to 879	Same as above	Same as above

Item	Address range	Field	Permitted settings
Y-axis zone setting data	880	Y-axis zone ON data	0 to ±99,999,999 pulses
			0 to ±99,999.000 mm
			0 to ±9,999.0000 inches
		Y-axis zone OFF data	0 to ±99,999,999 pulses
			0 to ±99,999.000 mm
			0 to ±9,999.0000 inches
		Data enable/disable	0, 1 (1: enable; 0: disable)
		External output ON/OFF	0, 1 (1; yes; 0: no)
		External output designation OUT1	0, 1 (1: designated; 0: not designated)
		External output designation OUT2	0, 1 (1: designated; 0: not designated)
	881 to 887	Same as above	Same as above
XY-axis speed data	900	Data 0	1 to 300,000 pps
			0.001 to 9,999.000 mm/s
			0.0001 to 999.0000 inch/s
	901 to 999	Data 1 to data 99	Same as above

SECTION 6
C500-NC222-E Operations

This section explains how to operate the C500-NC222-E Position Control Unit from the Teaching Box.

6-1 Executing Monitor and Override

This operation monitors axis operation status such as the current address, M code, current position, speed, dwell time, Z phase, origin signal, rotation direction, override coefficient, and deviation counter value while they are being refreshed. It is also used to change override instructions. Override is effective only in PROGRAM mode.

Procedure 1   **Monitoring the X Axis and Changing the Override**

1, 2, 3...   1. Select the X axis and set the address. In this example, the address is set to 100.

```
X MODE SELECTED
AD      100            _
```

2. Press the MON (Monitor) Key.

MON
```
XAD 101XMCODE11
_XPOS    5678P
```

Monitor the axis operation status with the Up and Down Arrow Keys.

↓
```
XSP    1000PS
_XDWELTIME   10
```

Monitoring of the origin, Z-phase, CW limit, and CCW limit is indicated as ON or OFF according to the current conditions of the external I/O points.

↓
```
XORG   ONXCW OFF
XDIR +  XCCWOFF
```

Note   When making override changes, the following screen can be used for three or more operations.

↓
```
XOVERRIDE 100
_ZX       ON
```

↓
```
XERRCNTR
_       12345P
```

↓
```
XAD 101XMCODE11
_XPOS  12345678P
```

3. Press the CHG (Change) Key when this screen is displayed.

```
XOVERRIDE
100.0 _
```

4. Set the override within a range of 0.1% to 999.9% in 0.1% increments, and press the WRITE Key.

2 0 0
```
XOVERRIDE
100    200           _
```

WRITE
```
XOVERRIDE  200
_ZX        ON
```

Procedure 2   **Monitoring the X and Y Axes**

1, 2, 3...   1. Select both the X and Y axes and set the address. In this example, the address is set to 100.

```
XY MODE SELECTED
AD      100              _
```

2. Press the MON (Monitor) Key.

   Press the Up and Down Arrow Keys to move between displays for the current address, M code, current position, speed, dwell time, Z-phase, origin signal, limit input signal, rotation direction, override coefficient, and deviation counter value.

   When the X and Y axes are set, override can be set after moving the cursor with the Left and Right Arrow Keys.

MON	XAD 100XMCODE11
	_YAD 500XMCODE12

↓	XPOS 5678P
	_YPOS 1234P

↓	XSP 1000
	YSP 500
	_

↓	XDWELTIME 10
	_YDWELTIME 20

↓	XORG OFF ZXOFF
	_YORG OFF ZYOFF

↓	XCWLS OFF
	_YCWLS OFF

↓	XCCWLS OFF
	_YCCWLS OFF

↓	XDIR - 1000
	_YDIR + 500

↓	XOVERRIDE 100
	_YOVERRIDE 110

↓	XERRCNTR 13450P
	_YERRCNTR 53450P

6-2   Origin Search

This operation moves the axis to the origin.

⚠ **Caution**   Before conducting an origin search, always be sure that the equipment will not be affected.

Axis operation is moved to the origin position at the speed specified in the origin search speed parameters. The origin search speed is set for the following addresses:

• Origin search high speed: 415 (X axis), 815 (Y axis)

• Origin search low speed: 417 (X axis), 817 (Y axis)

The origin will be established for the axis selected in the axis selection menu.

Procedure   **Executing an Origin Search**

1, 2, 3...   1. Select the axis and set the address. In this example the address is set to 100.

```
X MODE SELECTED
AD      100
                      _
```

2. Press the ORIG SRCH Key. The axis will start moving. After the origin is designated, the distance between the rising edge of the origin input signal to phase Z will be displayed.

[ORIG SRCH]
```
X ORG SRCH
```

After the origin search is complete.

```
X ORG-Z   100P
```

3. Press the CLR Key to return to the initial display.

```
X MODE SELECTED
AD      100
                      _
```

When Both the X and Y Axes are Selected
When both the X and Y axes are selected the display will be as follows:

```
XY MODE SELECTED
AD       100
                      _
```

[ORIG SRCH]
```
X ORG SRCH
Y ORG SRCH
```

After the origin search is complete.

```
X ORG-Z    100P
Y ORG-Z    100P
```

[CLR]
```
XY MODE SELECTED
AD       100
                      _
```

6-3   Start, Home Shift Start

Start and Home Shift Start execute positioning from the set address for the axes (X, Y, XY) selected.

Start executes positioning at the speed specified for the positioning action. Start and Home Shift Start are executed on the axis designated in the axis selection menu.

Axis	Action
X	X axis independent
Y	Y axis independent
XY	X axis only, Y axis only, X and Y axes simultaneously, interpolation start, synchronous start.

Home Shift Start executes positioning by adding the number of pulses designated in the Home Shift parameter (addresses 410 for the X axis and 810 for the Y axis) to the positioning action.

Note Always complete an origin search before conducting Start or Home Shift Start operations.

Procedure 1   **Operating an Axis Independently**

1, 2, 3...   1. Select the X axis and set the address. In the following example, the address is set to 200.

```
X MODE SELECTED
AD      200
                      _
```

2. Press the START Key.

| START (SHIFT START) | X MODE SELECTED
AD   200   _ |

For Home Shift Start, press the SHIFT Key and then press the START Key. Operation will continue as long as the START Key is pressed. When the key is released, operation will decelerate to a stop. The deceleration pattern is determined by the value set for the positioning action.

Procedure 2 **Operating Both the X and Y Axes**

1, 2, 3...   1. Select the XY axes and set the address. In the following example the address is set to 100.

| XY MODE SELECTED
AD   100   _ |

2. Press the START Key to select the type of action to be performed.

| START | START X100 Y100
X_Y XY INP SYNC |

3. Select the type of action (X axis only, Y axis only, X and Y axes simultaneously, interpolation start, synchronous start) using the Right Arrow Key.

| → → | START X100 Y100
X Y XY INP SYNC |

4. Press the START Key. For Home Shift Start, press the SHIFT Key and then press the START Key.

| START (SHIFT START) | XY MODE SELECTED
AD   100   _ |

Procedure 3 **Performing Operations in Sync With the X Axis**

1, 2, 3...   1. Select the XY axes and set the address. In the following example the address is set to 100.

| XY MODE SELECTED
AD   100   _ |

2. Press the START Key.

| START | START X100
X_Y XY INP SYNC |

3. Select "Sync" using the Right Arrow Key and press the SET Key.

| → → → → SET | SYNC START X100
X_Y |

4. Select the axis for operation. In this example the X axis is used, so press the SET Key.

| SET | SYNC START X100
SYNC POS AD 0   _ |

5. Select the synchronization address. Input the address and press the WRITE Key.

| 1 WRITE | SYNC START X100
SYNC POS AD 1   _ |

6. Press the START Key.

| START | XY MODE SELECTED
AD   100   _ |

6-4   Jogging

This procedure performs jogging operations for the selected axis or axes (X, Y, or XY).

⚠ **Caution**   Before conducting a jogging operation, always be sure that the equipment will not be affected.

Jogging operates in the X or Y direction according to the jog speed set in the parameters.

Jogging is activated by pressing jogging keys and continues operating while jogging keys are being pressed. Jogging stops when the jogging keys are released.

Jogging keys are allocated as indicated in the following table.

Axis	Key	Operation
X	▶	X-axis clockwise
	◀	X-axis counterclockwise
Y	▲	Y-axis clockwise
	▼	Y-axis counterclockwise
XY	▶	X-axis clockwise
	◀	X-axis counterclockwise
	▲	Y-axis clockwise
	▼	Y-axis counterclockwise
	▼◀	X-axis and Y-axis clockwise
	▲▶	X-axis and Y-axis counterclockwise
	▼	X-axis counterclockwise and Y-axis clockwise
	◀	X-axis clockwise and Y-axis counterclockwise

1, 2, 3...   1. Select the axis and set the address. In the following example, the address is set to 100.

```
X MODE SELECTED
AD      100              _
```

2. Press the MON (Monitor) Key. The current position will be displayed.

```
MON   XAD 100XMCODE 00
      _XPOS      0P
```

3. Press the jogging keys. The axis will start and the current position will be refreshed.

6-5   Inching

Inching proceeds according to the set number of pulses in the directions permitted by pressing the keys for the selected axis or axes (Y, Y, and XY).

Inching moves the selected axis or axes according to the number of pulses set in the parameters. Inching is activated by pressing the SHIFT Key in combination with any of the jogging keys, and operates for the set number of pulses to completion. The inching key combinations are shown in the following table.

Axis	Key	Operation
X	SHIFT ▶	X-axis clockwise
	SHIFT ◀	X-axis counterclockwise
Y	SHIFT ▲	Y-axis clockwise
	SHIFT ▼	Y-axis counterclockwise
XY	SHIFT ▶	X-axis clockwise
	SHIFT ◀	X-axis counterclockwise
	SHIFT ▲	Y-axis clockwise
	SHIFT ▼	Y-axis counterclockwise
	SHIFT ◤	X-axis and Y-axis clockwise
	SHIFT ◢	X-axis and Y-axis counterclockwise
	SHIFT ◥	X-axis counterclockwise and Y-axis clockwise
	SHIFT ◣	X-axis clockwise and Y-axis counterclockwise

1, 2, 3...   1. Select the axis and set the address. In the following example the address in set to 100.

```
X MODE SELECTED
AD      100              _
```

2. Press the MON Key. The current position will be displayed.

```
MON   XAD 100XMCODE 00
      _XPOS      0P
```

3. Press the inching keys. The axis will move and the current position will be refreshed.

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6-6   Teaching

Teaching is used to write a position reached by jogging or inching as the position for a positioning action.

After the address has been set, the position reached by jogging or inching is written to the set address. Data other than current position are set as needed.

1, 2, 3...   1. Select the axis and set the address. In the following example the address in set to 101.

```
X MODE SELECTED
AD      101          _
```

2. Press the TEACH Key.

[SPEED TEACH]
```
TEACHING AD101
XPOS  12345678       _
```

3. In this example press the Left and Right Arrow Keys. Positioning will be conducted using either jogging or inching.

[▶]
```
TEACHING AD101
XPOS -87654321P      _
```

4. Press the WRITE Key.

[WRITE]
```
TEACHING AD101
XSPD    AD 0         _
```

5. Input the necessary data and press the WRITE Key to write the data.

[1] [3]
```
TEACHING AD101
XSPD    AD 13        _
```

[WRITE]
```
TEACHING AD101
X-MCODE     0        _
```

[4] [5]
```
TEACHING AD101
X-MCODE    45        _
```

[WRITE]
```
TEACHING AD101
XDW TIME AD  0       _
```

[5]
```
TEACHING AD101
XDW TIME AD  5       _
```

[WRITE]
```
TEACHING AD101
XACC/DEC PTN 0       _
```

[7]
```
TEACHING AD101
XACC/DEC PTN 7       _
```

[WRITE]
```
TEACHING AD101
XPOS TYPE  ABS       _
```

[ABS INC]
```
TEACHING AD101
XPOS TYPE  INC       _
```

[WRITE]
```
TEACHING AD101
0:NO 1:YES  0        _
```

[WRITE]
```
TEACHING AD101
XPOS PTN    0        _
```

[1]
```
TEACHING AD101
XPOS PTN    1        _
```

[WRITE]
```
TEACHING AD101
0:NOP  1:OP 0        _
```

[1]
```
TEACHING AD101
0:NOP  1:OP 1        _
```

WRITE	SYNC START AD101 0:NOP 1:OP 0 _

1	SYNC START AD101 0:NOP 1:OP 1 _

WRITE	TEACHING AD102 XPOS -87654321P _

6-7   Change Current Position

This operation changes the current position of a positioning action.

⚠ **Caution**   Before changing the current position, always be sure that the equipment will not be affected.

The current position of the positioning action can by changed to any position. Positioning conducted after the current position has been changed will be executed according to the new data.

In the following example procedure the current position is changed from 50 to −111.

1, 2, 3...   1. Select the axis and set the address. In the following example, the address in set to 100.

X MODE SELECTED AD   100   _

2. Press the CHG Key. The current position will be displayed.

CHG	XCURRENT DATA 50P _

3. Press the CLR Key and input the new data.

CLR	1	1	1	XCURRENT DATA 111P _

+/−	XCURRENT DATA - 111P _

4. Press the WRITE Key.

If both the X and Y axes were selected in step 1, press the CHG Key and use the Up and Down Arrow Keys to toggle between the current position displays for the X and Y axes. After displaying the axis on which the changes to current position are to be made, input the data.

↓	YCURRENT DATA 100P _

↑	XCURRENT DATA 111P _

When the origin has not been established the display will be as follows:

XCURRENT DATA   --------P   _

YCURRENT DATA   --------P   _

6-8 Deceleration Stop

This operation is used to decelerate to a stop any axis in use.

⚠ **Caution** Before executing a deceleration stop, always be sure that the equipment will not be affected.

When operating in the PROGRAM mode, all axes in use can be decelerated to a stop regardless of the operation currently being performed.

When the start has been activated from the Teaching Box, releasing the START Key (i.e., turning the START Key OFF) will stop the operation.

While operations are being executed from the Teaching Box, the DEC/STOP Key cannot be used.

To execute a deceleration stop, press the DEC/STOP Key. All axes in operation will be decelerated to a stop.

6-9 Emergency Stop

Executing an emergency stop immediately stops all axes in operation.

⚠ **Caution** Before executing an emergency stop, always be sure that the equipment will not be affected.

During operation in the PROGRAM mode or MONITOR mode, an emergency stop will immediately stop all axes in use regardless of the operation currently being performed.

When the start has been activated from the Teaching Box, releasing the START Key (i.e., turning the START Key OFF) will stop the operation.

While operations are being executed from the Teaching Box, the EMERG Key cannot be used.

To execute an emergency stop, press the EMERG Key. All axes in operation will be immediately stopped.

6-10 Setting OUT1 and OUT2 Outputs

This operation sets the output signal from the PCU to the servo driver to either ON or OFF. The ON/OFF status of OUT1 and OUT2 for the X and Y axes can be set individually. The output signals turn ON and OFF at the same time the ON/OFF Key is pressed.

1, 2, 3...   1. Using the Right Arrow Key, select OUT on the mode selection screen, and press the SET Key.

| → | → | MODE SELECT
AXIS ERR OUT FU̲N |

| SET | SERVO OUTPUT
OU̲T1 OUT2 |

2. Using the Right Arrow Key, select OUT1 or OUT2, and press the SET Key.

| SET | OUT1 ON/OFF
X-OFF Y-OFF |

3. Select the X or Y axis and press the ON/OFF Key.

   Axes can be switched from ON to OFF or from OFF to ON by pressing the ON/OFF Key.

| ON/
OFF | OUT1 ON/OFF
X-ON Y-OFF |

6-11 Writing PCU Data to EEPROM

This operation writes data created in the PCU to the EEPROM memory. Transfer of data to the EEPROM memory is possible for all data for both the X and Y axes. When the power to the PCU is turned on, data is read from EEPROM and automatically set in internal RAM. At the time of shipping, all data necessary for operation is written into RAM. Before operation, be sure to check and adjust all data.

1, 2, 3...
1. Select FUN on the mode selection screen using the Right Arrow Key, and press the SET Key.

→ → →
```
MODE SELECT
AXIS ERR OUT FUN    _
```

SET
```
FUN SELECT
MCLR ROM SERVO
```

2. Select ROM on the FUN selection screen using the Right Arrow Key, and press the SET Key.

→
```
FUN SELECT
MCLR ROM SERVO
```

SET
```
DATA SAVE
WRITE READ
```

3. Press the SET Key and select "Write." The data will be written. While the write operation is in progress, the display will show the number of addresses being written.

SET
```
EEPROM WRITE
 XXX
```

```
EEPROM WRITE
 999    END
```

4. Press the Down Arrow Key to return to the screen displayed in step 2.

↓
```
DATA SAVE
WRITE READ
```

6-12 Reading Data From EEPROM

This operation reads PCU data written in EEPROM to the PCU Unit. Transfer of data to EEPROM memory is possible for all data for both the X and Y axes. This operation is executed whenever data written in EEPROM is checked or adjusted.

1, 2, 3...
1. Select FUN on the mode selection screen using the Right Arrow Key, and press the SET Key.

→ → →
```
MODE SELECT
AXIS ERR OUT FUN    _
```

SET
```
FUN SELECT
MCLR ROM SERVO
```

2. Select ROM on the FUN selection screen using the Right Arrow Key, and press the SET Key.

→
```
FUN SELECT
MCLR ROM SERVO
```

SET
```
DATA SAVE
WRITE READ
```

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3. Press the Right Arrow Key and select "Read." Then press the SET Key. The data will be read. While the read operation is in progress, the display will show the number of addresses being read.

| SET | EEPROM READ XXX |

| | EEPROM READ 999 END |

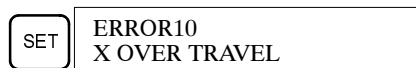4. Press the Down Arrow Key to return to the screen displayed in step 2.

| ↓ | DATA SAVE WRITE READ |
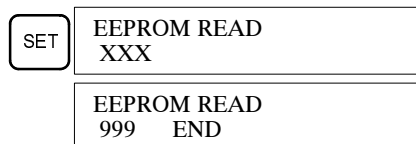
6-13 Error Displays

This operation displays the contents of errors that have occurred at the PCU. The first time an error occurs, an error message is displayed automatically. Automatic error message displays are enabled after selecting the mode.

Use the following procedure to display error messages.

1, 2, 3...   1. On the mode selection screen, use the Right Arrow Key to move the cursor to "Error."

| → | MODE SELECT AXIS ERR OUT FUN |

2. Press the SET Key. The error will be displayed.

| SET | ERROR10 X OVER TRAVEL |

• **Automatic Error Display Example**

| XAD 101XMCODE YAD 501YMCODE |

(An overtravel occurred on the X axis.)

| ERROR11 Y OVER TRAVEL |

| CLR | XAD 101XMCODE YAD 501XMCODE |

Pressing the CLR Key restores the display before the error occurred.

The CLR Key clears the display only, not the error itself. For details refer to *6-14 Resetting Errors*.

For further details on errors, refer to *Appendix B Error Code Displays and Error Processing*.

6-14 Resetting Errors

This operation is used to clear errors that have occurred at the PCU.

⚠ **Caution**   Before resetting errors, always be sure that the equipment will not be affected.

After an error has been displayed automatically, clear the message by pressing the ERR CLR Key and the CLR Key. Resetting is possible even while editing data.

To reset an error, press the ERR CLR Key at the screen in which the error message is displayed.

```
ERROR10
X OVER TRAVEL
```

ERR
CLR
```
XAD 101XMCODE11
_XPOS     5678P
```

6-15 PC Protect

Commands from a PC can be either enabled or disabled using the PC Protect function.

When PC Protect is set to ON, commands from the PC are ignored. Only the Teaching Box and external inputs are enabled.

For details regarding External Input Protect refer to *6-16 External Input Protect*.

Use the following procedure to set PC Protect.

1, 2, 3...   1. From the teaching mode selection screen use the Right Arrow Key to select "Debug." Then press the SET Key.

→
```
TEACHING MODE
PROG DEBUG MON
```

SET
```
DEBUG SELECT
PCP EXP COMTR
```

2. Select "PCP" from the Debug screen and press the SET Key.

SET
```
PC.PROTECT
    OFF        _
```

3. Set PC Protect by pressing the ON/OFF Key. (The ON/OFF Key toggles between the ON and OFF settings.)

ON/
OFF
```
PC.PROTECT
    ON         _
```

6-16 External Input Protect

The External Input Protect function determines whether external inputs will be enabled or disabled. External inputs are ignored when External Input Protect is ON, and only commands from the Teaching Box and PC are enabled.

For details on PC Protect, refer to *6-15 PC Protect*.

Use the following procedure to set External Input Protect.

1, 2, 3...   1. From the teaching mode selection screen, use the Right Arrow Key to select "Debug." Then press the SET Key.

→
```
TEACHING MODE
PROG DEBUG MON
```

SET
```
DEBUG SELECT
PCP EXP COMTR
```

2. Select "EXP" from the Debug screen.

→
```
DEBUG SELECT
PCP EXP COMTR
```

SET
```
EX.PROTECT
    OFF        _
```

3. Set External Input Protect by pressing the ON/OFF Key. (The ON/OFF Key toggles between the ON and OFF settings.)
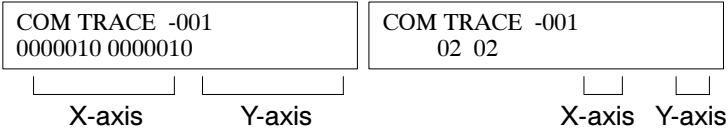
```
EX.PROTECT
    ON         _
```

6-17 Command Tracing

This operation displays the I/O status and commands for up to 128 previous steps. The commands and I/O status are stored in the trace memory, and command tracing reads that information.

Both PC and Teaching Box commands are stored in the trace memory.

I/O status and commands are stored as listed in the following table.

Trace memory	Data contents
0	Most recent command or I/O status
−1	Previous command or I/O status
−2	Second previous command or I/O status
−3 to −127	Third previous command or I/O status, etc.

1, 2, 3...   1. From the teaching mode selection screen, use the Right Arrow Key to select "Debug." Then press the SET Key.

> [→]   TEACHING MODE
>   PROG DEBUG MON
>
> [SET] DEBUG SELECT
>   PCP EXP COMTR
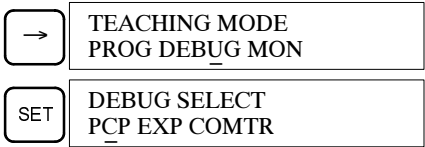
2. Select "Trace" from the debug selection screen using the Right Arrow Key, and press the SET Key.

   "0101" is a command OP code.

> [→] [→] DEBUG SELECT
>   PCP EXP COMTR_
>
> [SET] COM TRACE 000
>   0101

3. Press the Down Arrow Key to display "Trace Memory1."

> COM TRACE -001   COM TRACE -001
> 0000010 0000010   02 02
>
> X-axis   Y-axis   X-axis Y-axis

Thereafter, the following trace memory records will be displayed one by one when the Down Arrow Key is pressed.

X Axis and Y Axis I/O Status Allocations

	b_{14}	b_{13}	b_{12}	b_{11}	b_{10}	b_9	b_8
X-axis I/O status	OUT2 output	OUT1 output	CW LS input	CCW LS input	External interrupt input	External emergency stop input	Origin input

|	b_6	b_5	b_4	b_3	b_2	b_1	b_0
Y-axis I/O status	OUT2 output	OUT1 output	CW LS input	CCW LS input	External interrupt input	External emergency stop input	Origin input

6-18 Servomotor Free

This operation sets the selected axis to "servomotor free" or "servomotor lock." The servomotor status is set for the X axis and the Y axis respectively.

In the following example procedure, the servomotor status for the X axis is changed from servomotor lock to servomotor free.

1, 2, 3...   1. From the mode selection screen, use the Right Arrow Key to select "FUN." Then press the SET Key.

→   →   → | MODE SELECT
                | AXIS ERR OUT FUN   _

         SET | FUN SELECT
                | MCLR ROM SERVO
                      _

2. From the FUN selection screen, use the Right Arrow Key to select "SERVO." Then press the SET Key.

→   → | FUN SELECT
         | MCLR ROM SERVO_

   SET | SERVO AXIS SEL
          | X_Y
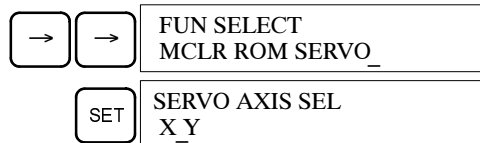
3. Select the axis and press the SET Key.

   SET | X-SERVO
          | _LOCK FREE

4. Press the Right Arrow Key and select "Free."

→ | X-SERVO
     | LOCK FREE_

5. Press the SET Key to set the servomotor status.

SECTION 7
Reading and Writing 3G2A5-NC111-EV1 Data

This section explains the operations involved in reading and writing parameters, speeds, and positioning actions for 3G2A5-NC111-EV1 Position Control Units, and explains how to insert and delete positioning actions.

⚠ **Caution**   Confirm that no adverse effect will occur in the system before changing any set value in memory.

⚠ **Caution**   Confirm that the set parameters operate correctly.

7-1   Writing Parameters

When writing PCU data, parameters must be written first, followed by speeds and then positioning actions.

The addresses for parameters are 2000 to 2011. For parameter setting ranges, refer to *7-9 PCU Data and Setting Ranges*.

Note Before inputting new data, be sure to clear all the previous data. Refer to *4-6 Deleting Data From a 3G2A5-NC111-EV1 PCU*.

Example   The following example shows how to write parameters, using the settings listed in this table.

Address	Data contents	
2000	Unit	1
2001	Pulse rate	1
2002	CW limit	99,999
2003	CCW limit	99,999
2004	Backlash compensation	15
2005	Maximum speed	15,000
2006	Start speed	20
2007	Acceleration/deceleration time	1
2008	Constant-speed feeding at the end of positioning	20
2009	Dwell time	1.5
2010	Search pattern and origin search direction	1, CW
2011	Origin compensation	10

1, 2, 3...   1. Press the CLR Key, and then press the PRMTR Key.

CLR PRMTR   2000 DIMENSION
                      0

2. Press the "1" Key.

1   2000 DIMENSION
     MM   1

3. Press the WRITE Key.

WRITE   2001 PULSE RATE
                0

4. Next, perform the key inputs shown below.

1   2001 PULSE RATE
            1

WRITE   2002 CW LIMIT
               0

9   9   2002 CCW LIMIT
              99999

Press 9 five times.

WRITE   2003 CCW LIMIT
                0

9   9   2003 CW LIMIT
              99999

Press 9 five times.

WRITE	2004 BACKLASH 0
1 5	2004 BACKLASH 15
WRITE	2005 MAX SPEED 0
1 5 0 0 0	2005 MAX SPEED 15000
WRITE	2006 START SPEED 0
2 0	2006 START SPEED 20
WRITE	2007 ACC/DEC TIME 0
1	2007 ACC/DEC TIME 1
WRITE	2008 CREEP PULSE 0
2 0	2008 CREEP PULSE 20
WRITE	2009 DWELL TIME 0
1 · 5	2009 DWELL TIME 1.5
WRITE	2010 ORG SEARCH 0
1	2010 ORG SEARCH 10
CW/CCW	2010 ORG SEARCH 11
WRITE	2011 ORG CORRECT 0
1 0	2011 ORG CORRECT 10
WRITE	2011 ORG CORRECT 10

7-2 Writing Speeds

The addresses for speeds are 4000 to 4009. For speed setting ranges, refer to *7-9 PCU Data and Setting Ranges*.

Note Before inputting new data, be sure to clear all the previous data. Refer to *4-6 Deleting Data From a 3G2A5-NC111-EV1 PCU*.

Example The following example shows how to write speeds, using the settings listed in this table.

Address	Data contents	
4000	Speed #0 (Origin return high speed; manual high speed)	3,500
4001	Speed #1 (Origin search high speed)	2,000
4002	Speed #2 (Origin search low speed; manual low speed)	500
4003	Speed #3	1,000
(4004 to 4008)	(Speed #4 to Speed #8)	
4009	Speed #9	

Speeds #0 to #2 contain combinations of origin return, origin search, and manual speeds.

1, 2, 3...
1. Press the CLR Key, and then press the SPEED Key.

CLR SPEED | 4000 ORG RETURN |

2. Enter "3500" by pressing the numeric keys.

3 5 0 0 | 4000 ORG RETURN |
              | 3500 |

3. Press the WRITE Key.

WRITE | 4001 ORG SEARCH |

4. Next, perform the key inputs shown below.

2 0 0 0 | 4001 ORG SEARCH |
              | 2000 |

WRITE | 4002 MANUAL L0W |

5 0 0 | 4002 MANUAL LOW |
           | 500 |

WRITE | 4003 SPEED   3 |

1 0 0 0 | 4003 SPEED   3 |
              | 1000 |

WRITE | 4004 SPEED   4 |

7-3 Writing Positioning Actions

This operation writes positioning actions to the Position Control Unit. The positioning action addresses are 1000 to 1199. For speed setting ranges, refer to *7-9 PCU Data and Setting Ranges*.

Note Before inputting new data, be sure to clear all the previous data. Refer to *4-6 Deleting Data From a 3G2A5-NC111-EV1 PCU*.

Example The following example shows how to write positioning actions, using the settings listed in this table.

Address	Data contents
1000	Completion code: 0; ABS; coordinate: -1600; speed #2
1001	Completion code: 1; ABS; coordinate: 1500; bank end; speed #4

1, 2, 3...
1. Press the CLR Key, and then press the ADR Key.

   CLR | SEQ | 1000 POS

2. Press the Down Arrow Key.

   ↓ | 1000 POS

3. Press the PATT Key, and then press the "0" Key.

   PATT | 0 | 1000 POS PTN 0 / INC

4. Press the ABS/INC Key.

   ABS/INC | 1000 POS PTN 0 / ABS

5. Press the +/− Key twice to display the minus sign.

   +/− | +/− | 1000 POS PTN 0 / ABS   −

6. Enter "6000" by pressing the numeric keys.

   6 | 0 | 0 | 0 | 1000 POS PTN 0 / ABS   6000   −

7. Press the SPEED Key.

   SPEED | 1000 POS / SPEED

8. Press the "2" Key.

   2 | 1000 POS / SPEED   2

9. Press the WRITE Key.

   WRITE | 1001 POS

10. Next, perform the key inputs shown below.

    PATT | 1 | 1001 POS PTN 1 / INC

    ABS/INC | 1001 POS PTN 1 / ABS

    1 | 5 | 0 | 0 | 1001 POS PTN 1 / ABS   1500

    SPEED | 1000 POS / SPEED

	1001 POS SPEED L
·	

	1001 POS SPEED L4
4	

	1002 POS
WRITE	

7-4 Writing Parameters

This operation writes parameter data to the Position Control Unit. The parameter addresses are 2000 to 2011.

Example

The following example shows how to write parameters, using the settings listed in this table.

Address	Data contents	
2000	Unit	4
2001	Pulse rate	1
2002	CW limit	99,999
(2003 to 2010)		
2011	Origin compensation	

1, 2, 3...
1. Press the CLR Key, and then press the PRMTR Key.

CLR	PRMTR	2000 DIMENSION PULSE 4

2. Press the Down Arrow Key.

↓	2001 PULSE RATE 1

3. Press the Down Arrow Key to display the parameter data at the next address.

↓	2002 CW LIMIT 99999

Press the Up Arrow Key to display the parameter data at the previous address.

↑	2001 PULSE RATE 1

7-5 Reading Speeds

This operation reads speed data that has been written to the Position Control Unit.

Example

The following example shows how to write speeds, using the settings listed in this table.

Address	Data contents	
4000	Speed #0 (Origin return high speed; manual high speed)	3,500
4001	Speed #1 (Origin search high speed)	2,000
4002	Speed #2 (Origin search low speed; manual low speed)	500
(4003 to 4008)	(Speed #3 to Speed #8)	
4009	Speed #9	

1, 2, 3...   1. Press the CLR Key, and then press the SPEED Key.

> CLR SPEED   4000 ORG RETURN
>   3500

2. Press the Down Arrow Key.

> ↓   4001 ORG SEARCH
>   2000

3. Press the Down Arrow Key to display the speed data at the next address.

> ↓   4002 MANUAL LOW
>   500

Press the Up Arrow Key to display the speed data at the previous address.

> ↑   4001 ORG SEARCH
>   2000
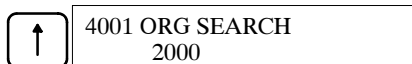
7-6 Reading Positioning Actions

This operation reads positioning actions that have been written to the Position control Unit. The positioning action addresses are 1000 to 1199. Positioning actions can be read by specifying their respective addresses.

Example

The following examples show how to read positioning actions, with the settings listed in this table.

Address	Data contents
1000	Completion code: 0; ABS; coordinate: -6000; speed #2
1001	Completion code: 1; ABS; coordinate: 1500; bank end; speed #4
(1002 to 1098)	
1099	Completion code: 1; ABS; coordinate: -9500; speed #9
(1100 to 1199)	

Procedure 1

In this example procedure, positioning actions are read in order beginning with address 1000.

1, 2, 3...   1. Press the CLR Key, and then press the ADR Key.

> CLR SEQ   1000 POS

2. Press the Down Arrow Key to display the completion code and coordinate data for address 1000.

> ↓   1000 POS PTN 0
>   ABS   6000

3. Press the Down Key to display the speed for address 1000.

```
 ↓   1000 POS
     SPEED      2
```

4. Press the Down Key to display the completion code and coordinate data for address 1001.

```
 ↓   1001 POS PTN 0
     ABS      1500
```

5. Press the Down Key to display the speed for address 1001.

```
 ↓   1001 POS
     SPEED      4
```

Press the Up Arrow Key to display the previous data.

```
 ↑   1001 POS PTN 0
     ABS      1500
```

Procedure 2   In this example positioning actions at specified addresses are read.

1, 2, 3...   1. Press the CLR Key, and then press the ADR Key.

```
 CLR   SEQ   1000 POS
```

2. Enter "99" by pressing the numeric keys.

```
 9   9   1099 POS
```

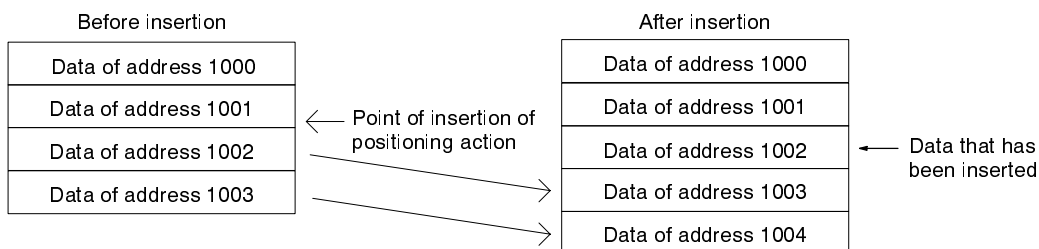3. Press the SRCH Key to display the completion code and coordinate data for address 1099.

```
 SRCH   1099 POS PTN 0
        ABS      999999
```

4. Press the Down Key to display the speed for address 1099.

```
 ↓   1099 POS
     SPEED      9
```

7-7   Inserting Positioning Actions

This operation inserts a positioning action at a designated address, and shifts all subsequent positioning actions to the next address.

Example   The following example shows how to insert a positioning action at address 1002, with the settings listed in this table.

Address	Data contents
1002	Completion code: 1; ABS; coordinate: 1000; speed #3

Note   1. A positioning action cannot be inserted if data has already been written to the last address for positioning actions (1199).

2. Parameters and speeds cannot be inserted.

1. Press the CLR Key, and then press the ADR Key.

CLR	SEQ	1000 POS

2. Press the "2" Key.

2	1002 POS

3. Press the SRCH Key to display the completion code and coordinate data for address 1002.

SRCH	1002 POS PTN 0 ABS 5000

4. Press the PATT Key, and then press the "1" Key.

PATT	1	1002 POS PTN 1 INC

5. Press the ABS/INC Key.

ABS INC	1002 POS PTN 1 ABS

6. Enter "1000" by pressing the numeric keys.

1	0	0	0	1002 POS PTN 1 ABS 1000

7. Press the SPEED Key.

SPEED	1002 POS SPEED

8. Press the "3" Key.

3	1002 POS SPEED 3

9. Press the Press the DEL/INS Key.

DEL INS	1003 POS PTN 0 ABS 5000

7-8   Deleting Positioning Actions

This operation deletes a positioning action from a designated address. The subsequent positioning actions are shifted back to fill in the vacant address, and their addresses are each decremented by one.

Before deletion

Data of address 1000
Data of address 1001
Data of address 1002
Data of address 1003
Data of address 1004
Clear data

← Delete →

After deletion

Data of address 1000	
Data of address 1001	
Data of address 1003	(Address becomes 1002.)
Data of address 1004	(Address becomes 1003.)
Clear data	
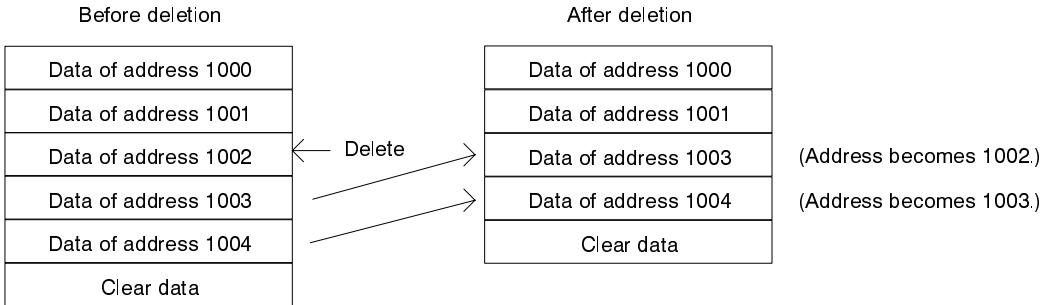
Note Parameters and speeds cannot be deleted.

Use the following procedure to delete a positioning action. In this example, the positioning action at address 1002 is deleted.

1. Press the CLR Key, and then press the ADR Key.

CLR	SEQ	1000 POS

2. Press the "2" Key.

2	1002 POS

3. Press the SRCH, SHIFT, and DEL/INS Keys in order.

SRCH	SHIFT	DEL/INS	1002 POS PTN 0 ABS 10000

4. Press the SHIFT Key and then press the DEL/INS Key.

SHIFT	DEL/INS	1002 POS PTN 0 ABS 50000

7-9   PCU Data and Setting Ranges

The following table shows the contents and the permissible ranges for setting PCU data. The contents of positioning actions are provided in the order in which data is input from the Teaching Box.

Item	Address	Name	Permitted settings
Positioning actions	1000	Position	0 to 999,999 puls
		Completion code	Continuous: 1, terminating: 0
		ABS/INC	INCremental: 1, ABSolute: 0
		Position field sign	Positive 1, negative: 0
		Bank end	"L" is band end
		Speed	0 to 9
	1001 through 1199	Same as above	Same as above
Parameters	2000	Unit	1 to 4 (1: mm; 2: inch; 3: angle; 4: pulse)
	2001	Pulse rate	0.0001 to 1.0000
	2002	CW limit	0 to 999,999 pulses
	2003	CCW limit	0 to 999,999 pulses
	2004	Backlash compensation	0 to 9,999 pulses
	2005	Maximum speed	0 to 100,000 pps
	2006	Start speed	0 to 1,500 pps
	2007	Acceleration/deceleration time	0.1 to 9.9 s
	2008	Constant-speed feeding at end of positioning	0 to 255 pulses
	2009	Dwell time	0 to 99.99 s
	2010	Origin search completion code, direction	Completion code: 0 to 5 CCW: 1, CW: 0
	2011	Origin compensation	$\pm$0 to 9,999 pulses

Item	Address	Name	Permitted settings
Speeds	4000	Speed #0: Origin return speed (manual high speed)	1 to 100,000 pps
	4001	Speed #1: Origin search high speed	1 to 100,000 pps
	4002	Speed #2: Origin search low speed (manual low speed)	1 to 100,000 pps
	4003 to 4009	Speed #3 to Speed #9	1 to 100,000 pps

For details regarding the contents of the settings, refer to the *3G2A5-NC111-EV1 Position Control Unit Operation Manual (W142)*.

SECTION 8
3G2A5-NC111-EV1 Operations

This section explains how to operate the 3G2A5-NC111-EV1 Position Control Unit from the Teaching Box.

8-1 Origin Search and Origin Return

⚠ **Caution**   Before conducting an origin search or an origin return, always be sure that the equipment will not be affected.

Origin Search moves the axis to the origin. Origin Return moves the axis back to the origin from any other position. During origin search, axis operation towards the origin is performed at the speed specified in speed addresses 4001 to 4002.

Speed data address 4001: Origin search high speed

Speed data address 4002: Origin search low speed

During origin return, axis operation towards the origin is performed at the speed specified in speed address 4000.

Procedure 1   **Executing Origin Search**

1, 2, 3...   1. Press the CLR Key. Then press the ORIG SRCH Key.

| CLR | ORIG SRCH | ORG SEARCH
CURRENTLY 30000 |

The current positions are not displayed immediately after the power is turned on.

2. When the origin search is complete, the current position will be "0.0000."

| ORG SRCH
CURRENT 0.0000 |

Procedure 2   **Executing Origin Return**

1, 2, 3...   1. Press the CLR Key. Then press the ORIG RETRN Key.

| CLR | ORIG RETRN | ORG RETURN
CURRENTLY 25000 |

2. When the origin return is complete, the current position will be "0.0000."

| ORG RETURN
CURRENT 0.0000 |

8-2 Step Execution

This procedure operates the axis according to a designated positioning action address. It reads the positioning action to be performed and starts axis operation when step execution is pressed.

Note   Before using step execution, always use origin search to establish the origin.

In this example procedure, the axis is operated according to data set at the positioning action address of 1000.

1, 2, 3...   1. Press the CLR Key. Then press the ADR Key.

| CLR | SEQ | 1000 POS |

2. Press the Down Arrow Key.

| ↓ | 1000 POS PTN 0
ABS   1000 |

3. Press the STEP EXEC Key.

| STEP EXEC | 1001 POS PTN 0
ABS   1000 |

8-3 Manual Operation

Manual operation can be performed at low speed or high speed.

⚠ **Caution** Before conducting an origin search or an origin return, always be sure that the equipment will not be affected.

Use the following arrow keys when conducting manual operation.

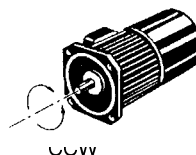**Right Key**: Manual low-speed operation (CW)
Left Key: Manual low-speed operation (CCW)
Right Key + HIGH SPEED Key: Manual high-speed operation (CW)
Left Key + HIGH SPEED Key: Manual high-speed operation (CCW)

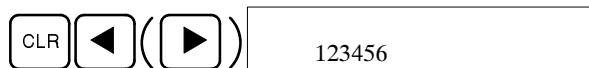To stop axis operation, press the EMERG (Emergency Stop) Key.

Note The CW and CCW directions are as viewed from the output axis of the motor. See the following diagram.

CCW

Procedure 1 **Executing Low-speed Manual Operation**

Press the CLR Key. Then press the Left Arrow Key (or Right Arrow Key.)

CLR ◀ (▶) | 123456

Procedure 2 **Executing High-speed Manual Operation**

1, 2, 3... 1. Press the CLR Key. Then press the HIGH SPEED Key while holding down the Left Arrow Key (or Right Arrow Key.)

CLR

◀ (▶) + HIGH SPEED | 123456

2. The screen shown above in this example is the display after the origin has been established. When the origin has not been established, the current positions will not be displayed.

8-4 Teaching

This operation writes the position established during manual operation to the PCU memory.

When the positioning action read manual operation is performed, the position data is obtained. The completion code and speed address can be changed using the keys on the key pad.

The following example shows a teaching operation for positioning action address 1000. The speed is set to 9 and the completion code set to 1.
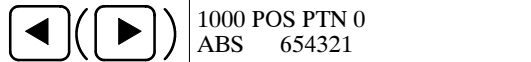
1, 2, 3... 1. Press the CLR Key. Then press the ADR (Sequence) Key.

CLR SEQ | 1000 POS

2. Press the Down Arrow Key.

↓ | 1000 POS PTN 0
ABS   123456
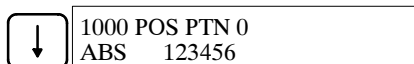
3. Press the Left Arrow Key (or Right Arrow Key) for manual operation. The position data will be obtained.

◀ (▶) | 1000 POS PTN 0
ABS   654321 |

4. Press the PATT (Pattern) Key to set the completion code, and press "1."

PATT | 1 | 1000 POS PTN 1
ABS   654321 |

5. Press the SPEED Key and then press "9."

SPEED | 9 | 1000 POS
SPEED   9 |

6. Press the TEACH Key.

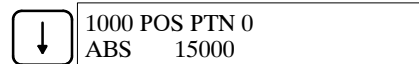TEACH | 1001 POS |

8-5 Emergency Stop

⚠ **Caution**   Before executing an emergency stop, always be sure that the equipment will not be affected.

When the EMERG (Emergency Stop) Key is pressed during manual operation or step execution positioning is stopped. In the following example, emergency stop is used during execution of the positioning action at address 1000.

1, 2, 3...   1. Press the CLR Key. Then press the ADR (Sequence) Key.
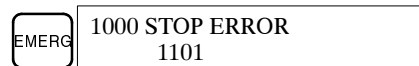
CLR | SEQ | 1000 POS |

2. Press the Down Arrow Key.

↓ | 1000 POS PTN 0
ABS   15000 |

3. Press the STEP EXEC Key.

STEP EXEC | 1000 POS PTN 0
ABS   10000 |

4. Press the EMERG Key.

EMERG | 1000 STOP ERROR
     1101 |
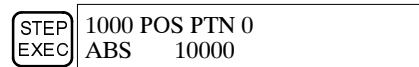
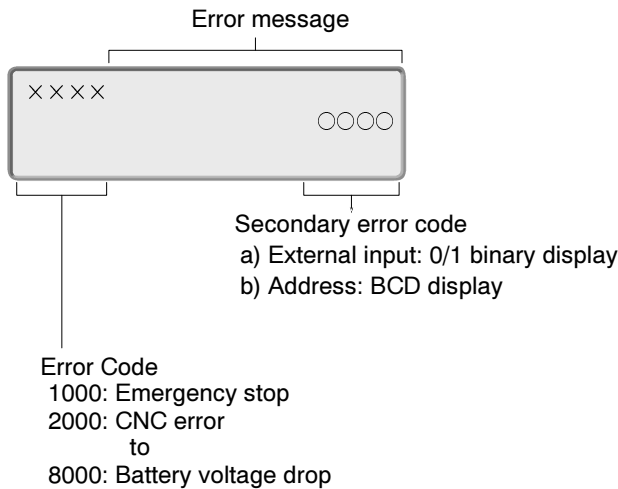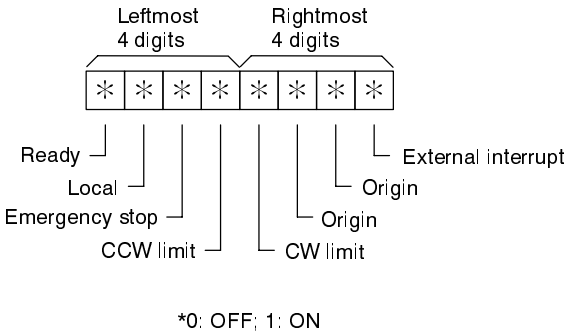## 8-6   Error Displays

Details of errors occurring in the PCU are automatically displayed. The error display format is as follows:

Error message

×××× ○○○○

Secondary error code
 a) External input: 0/1 binary display
 b) Address: BCD display

Error Code
 1000: Emergency stop
 2000: CNC error
        to
 8000: Battery voltage drop

In the secondary error code, the external input is either displayed as 0/1 or the address where the error occurred is displayed.

When the external input is displayed, the data allocation is as follows, with the leftmost four digits displayed first. Press the Down Arrow Key to display the rightmost four digits.

Leftmost 4 digits   Rightmost 4 digits

✳ ✳ ✳ ✳ ✳ ✳ ✳ ✳

Ready
Local
Emergency stop
CCW limit
CW limit
Origin
Origin
External interrupt

*0: OFF; 1: ON

The following example shows how to display errors. In this example, the external emergency stop is OFF.

1, 2, 3...   1. When an error occurs the following screen is displayed. The leftmost four digits of the external input will be displayed in the secondary error code.
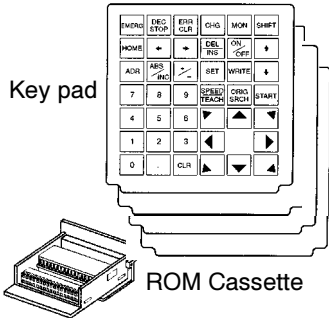
1000 STOP ERROR
1101

2. Press the Down Arrow Key. The leftmost four digits of the external input will be displayed in the secondary error code.

↓   1000 STOP ERROR
1101

For information regarding other error codes, refer to *Appendix B Error Code Displays and Error Processing.*

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Appendix A
Standard Models

Connected unit	MC Unit	PCU
Teaching Box 	CVM1-PRO01 (Without ROM Cassette) CVM1-PRS21-EV1 (ROM Cassette needs to be replaced) CVM1-PRS71 (ROM Cassette needs to be replaced) (Any one of the above)	
ROM Cassette Key pad ROM Cassette	CVM1-MP702 (Can be used with MC Units or PCUs.)	
Appropriate devices	CV500-MC421 CV500-MC221 C200H-MC221	C500-NC222-E 3G2A5-NC111-EV1
Connection cable 	CV500-CN224 (2 m) CV500-CN424 (4 m) CV500-CN624 (6 m) (Any one of the above)	
Conversion Adaptor 	Not used	CV500-CIF11 (NC111-EV1) CV500-CIF21 (NC222-E)
Applicable Manuals	CVM1-PRO01 Teaching Box (For Motion Control Units) Operation Manual (W320)	This Manual

Note If the CVM1-PRS21-EV1 Programming Console or CVM1-PRS71 Teaching Box for the MC Unit is to be used, replace its ROM Cassette and Key Sheet in order to use the Unit as a Teaching Box for the Position Control Unit. Purchase the CVM1-MP702 ROM Cassette.

Appendix B
Error Code Displays and Error Processing

These tables show the error code displays, causes of errors, and possible remedies. Refer to this appendix when an error occurs. "PC" stands for "Programmable Controller" and "PCU" stands for "Position Control Unit."

C500-NC222-E Position Control Unit

Error	Error code display	Cause of error	Remedy
Hardware errors	ERROR01 BUS ERROR	An abnormality was found in bus hardware when accessing the bus.	Replace the bus hardware.
	ERROR02 EEPROM VERIFY	An abnormality was found in the EEPROM when executing the STORE command.	Replace the EEPROM.
	ERROR03 WDT ERROR	The reset hangs because of circuit problems or because the reset clearing signal does not arrive.	Check signal routing from the CPU of the PC (CPU, Backplane, I/O interface Unit, Expansion I/O Racks). If no problems exist in the routing then the error is in the PCU, and cannot be corrected by the user. Replace the PCU.
System errors	ERROR10 X OVER TRAVEL	The CW or CCW limit input turned ON for the X axis when the operation was not an origin search.	Press the ERR CLR key (error clear). This does not erases the stored origin, so jogging and origin search operations are enabled.
	ERROR11 Y OVER TRAVEL	The CW or CCW limit input turned ON for the Y axis when the operation was not an origin search.	Press the ERR CLR key (error clear). This does not erases the stored origin, so jogging and origin search operations are enabled.
	ERROR12 X ERR CNTR OVER	The X-axis error counter overflowed.	The error counter count exceeded its maximum value when a workpiece got caught on or bumped into an obstruction. Remove the obstruction, clear the error, and reestablish the origin.
	ERROR13 Y ERR CNTR OVER	The Y-axis error counter overflowed.	
Wiring errors	ERROR20 X REVERCE WIRE	Phase-difference signals (phases A and B signals) from the X-axis encoder are reversed.	Turn off the power and interchange phases A and B or change the parameter data to change phases A and B.
	ERROR21 Y REVERCE WIRE	Phase-difference signals (phases A and B signals) from the Y-axis encoder are reversed.	
	ERROR22 X SNAP OF WIRE	The positioning loop wire of the X axis is disconnected.	Connect the positioning loop wire.
	ERROR23 Y SNAP OF WIRE	The positioning loop wire of the Y axis is disconnected.	
OP code errors	OP code ERROR30 XXXX ILLEGAL COMMAND	An undefined OP code was sent as a command	Correct the command and retransmit.
	ERROR31 XXXX OPERAND LENGTH	Operands longer or shorter than the defined length are attached to the command.	

Error	Error code display	Cause of error	Remedy
OP code errors	ERROR32 XXXX COMMAND TIMING1	A command valid only when the motor is stopped was received when the motor was operating, or a command valid only when the motor is operating was received when the motor was stopped.	Consider the PC program timing, and correct the command transfer timing.
	ERROR33 XXXX COMMAND TIMING2	A synchronization start command and normal start command are transmitted together.	Consider the PC program timing, and correct the command transfer timing.
	ERROR34 XXXX COMMAND TIMING3	A servomotor control command was transmitted when during servomotor free.	Consider the PC program timing, and correct the command transfer timing.
	ERROR35 XXXX CMD IN INTERPOL	A command for a single axis was received during interpolation.	Consider the PC program timing, and correct the command transfer timing.
	ERROR36 CMD IN SINGLE	An interpolation control command was transmitted during a single axis operation.	Consider the PC program timing, and correct the command transfer timing.
	ERROR40 XXXX ILLEGAL OPERAND	An undefined operand was received.	Correct the operand and retransfer the command.
	ERROR41 XXXX ILLEGAL OPERAND	The operand format is incorrect.	
Data errors	ERROR50 XXXX INTERPOL DATA	Data designated by interpolation start command was not interpolation positioning action.	Correct the data and retransfer the command.
	ERROR51 XXXX INTERPOL DATA	Among interpolation positioning action, data for one axis is disabled.	
	ERROR52 XXXX CIRCULAR DATA	The center or intermediate point is the same as the end point; an arc cannot be produced.	
	ERROR53 XXXX CIRCULAR DATA	No interpolation end point data followed the center or intermediate point data.	
	ERROR54 XXXX DATA ADDRESS	Data beyond the defined range was transferred.	Correct the data and retransfer the command.
	ERROR55 XXXX DATA LENGTH	The data length did not fit the defined range.	
	ERROR56 XXXX DATA TIMING	Data transfer occurred during operation.	Data cannot be transferred during operation. Transfer data while the axes are stopped.
	ERROR57 XXXX ILLEGAL DATA	Data beyond the defined range was transferred.	Correct the data and retransfer.
	ERROR58 ILLEGAL DATA	The data format did not fit the defined range.	Correct the data and retransfer.
	ERROR59 SOFT LIMIT	The position of the positioning action exceeded the positive and negative limit parameters.	Check the positioning value to be executed or check the limit parameters.
	ERROR60 XXXX SPEED 0	The speed called in the positioning action was 0.	Check the speeds or speed fields of the positioning actions.
	ERROR61 XXXX SEARCH INCOMP	Origin search incomplete.	Establish the origin with Origin Search or Changing Current Position Operation.

Error	Error code display	Cause of error	Remedy
Commu-nication errors	ERROR70 PARITY ERROR	Parity check uncovered an abnormality.	Clear the error with ERST, and perform the following steps. If the error does not clear, there may be a hardware problem that is not user serviceable; replace the PCU.
	ERROR71 FRAMING ERROR	Data format broke down during transfer.	1. Check for faulty cable connections. 2. Exchange the external display for the Teaching Box or the Teaching Box itself.
	ERROR72 OVER RUN ERROR	Handshake abnormality	3. Replace the cables of the peripheral equipment (C200H-CN-222 or C200H-CN-422). 4. Replace the PCU.
	ERROR80 XXXX TRANS CH OVER	The number of channels transferred exceeded the maximum permissible number.	Change the PC program so the number of channels transferred remains within the permissible number.

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Error	Error code display	Cause of error	Remedy
Emergency stop	1000 STOP ERROR 1101	The external input emergency stop switch was turned off. Use the Down Arrow Key to scroll down and display the rightmost four digits that show the secondary error code.	Reset and resume operation.
	1000 STOP ERROR 1000		
	1000 STOP ERROR 1111	An emergency stop was generated by the Teaching Box. Use the Down Arrow Key to scroll down and display the rightmost four digits that show the secondary error code.	
	1000 STOP ERROR 1000		
CNC error	2000 CNC ERROR 1011	Workpiece is at or exceeds CW limit.	LOCAL mode: set workpiece within the designated limits, reset, and resume. REMOTE mode: reset and resume.
	2000 CNC ERROR 0000		
	2001 CNC ERROR 1010	Workpiece is at or exceeds CCW limit position.	
	2001 CNC ERROR 1000		
	2002 CNC ERROR 0011	Ready input turned OFF upon execution of inching, START, ORIGIN SEARCH, or ORIGIN RETURN.	Turn ON Ready input, reset functions, and resume positioning.
	2002 CNC ERROR 1000		
	2003 CNC ERROR 1011	The PCU mode switched during motor operation.	Set the correct mode, and resume positioning.
	2003 CNC ERROR 1000		

Error	Error code display	Cause of error	Remedy
CNC error	2010 CNC ERROR 1001	Successive positioning actions attempted to change the direction of motor rotation without deceleration.	Reset and correct the positioning action attributes so that the motor shaft does not reverse direction when the positioning action completion code is set to 1.
	2011 CNC ERROR 1002	Positioning action with a completion code of 1 (continuous) is also designated as the bank end.	Reset, and set the completion code to 0 to for any positioning actions that are designated as bank ends.
	2012 CNC ERROR 1000	No positioning action existed at START.	Reset, and and set data for positioning action in question.
	2013 CNC ERROR 1000	Execution of positioning action exceeding CW limit was detected.	Reset, and correct positioning action in question so that positions lie within the limits.
	2014 CNC ERROR 1001	Execution of positioning action exceeding CCW limit was detected.	
	2015 CNC ERROR 1001	Positioning action is input in manner that makes trapezoidal acceleration/deceleration impossible.	Reset, correct positioning action in question, and avoid parameters that will cause sudden acceleration/deceleration.
	2016 CNC ERROR 2006	Initial speed (address 2006) is higher than maximum speed (address 2005) so the acceleration/deceleration table could not be generated.	Reset, and set initial speed slower than maximum speed.
	2017 CNC ERROR 1000	Because the pulse rate was zero, positioning action could not be converted to pulses.	Reset, and set pulse rate between 0.0001 and 1.
	2019 CNC ERROR 4001	Execution of ORIGIN SEARCH was attempted when ORIGIN SEARCH speed was set lower the manual low speed.	Reset and set manual low speed slower than ORIGIN SEARCH speed.
Battery voltage drop	8000 BAT ERROR 1111	The voltage of the RAM backup battery drops to 3 volts or less.	Replace the battery (3G2A9-BAT08), reset, and resume positioning.

Appendix C
Specifications and External Dimensions

General specifications and external dimensions are given below.

General Specifications

Item	Specifications
Power supply	300 mA max. at 5 VDC$^{+5\%}/_{-10\%}$, (Supplied from the PCU.)
Ambient operating temperature	0°C to 55°C
Ambient operating humidity	10% to 90% RH (no condensation)
Ambient operating atmosphere	No corrosive gasses
Storage temperature	−20°C to 75°C
Display	Semi-transmissive liquid crystal display (with LED) 16 characters x 4 rows; 5 x 7 dots/character
Weight	370 g
External dimensions	192 x 96 x 48.5 mm (H x W x D)

External Dimensions (Unit: mm)
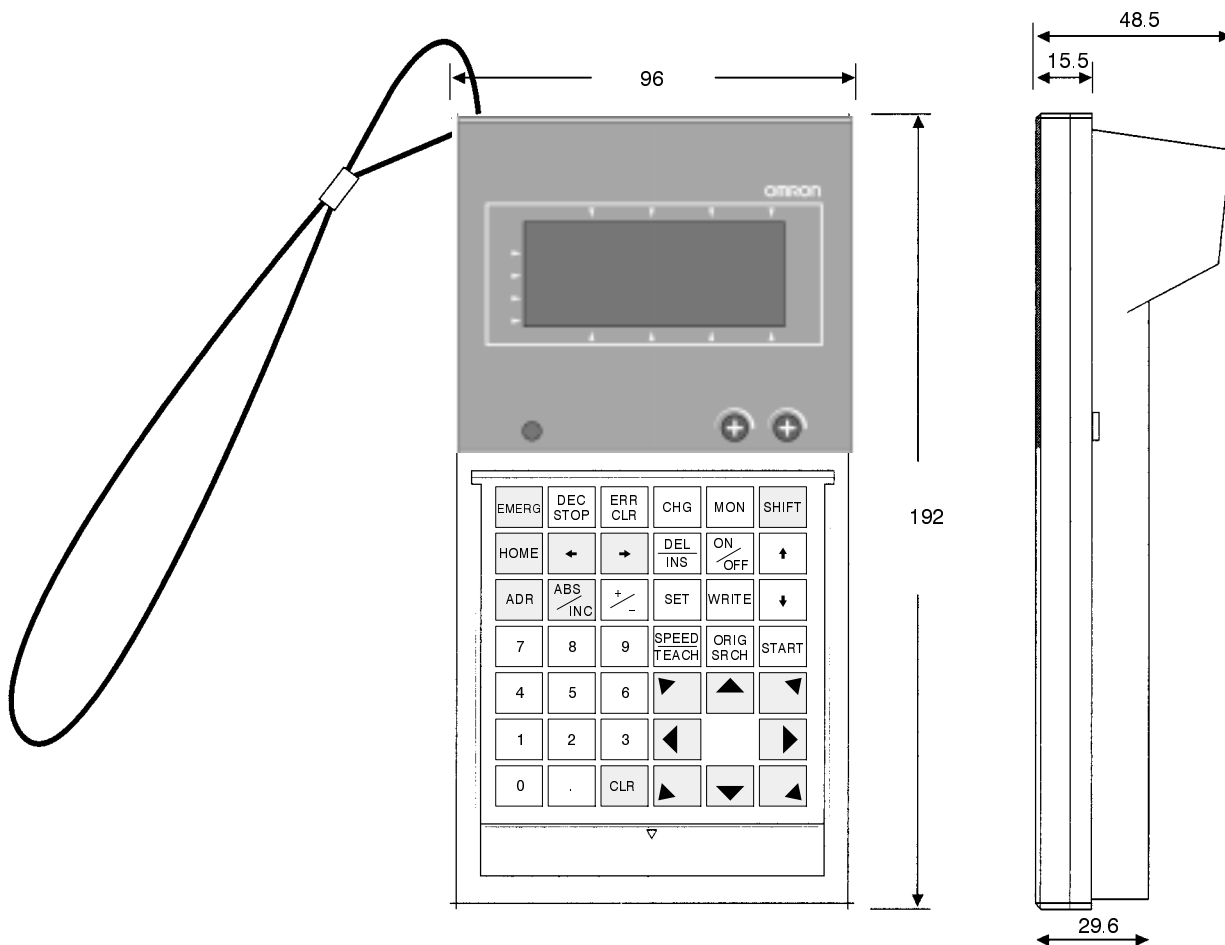
The key sheet shown here is for the C500-NC222-E

Appendix D
Coding Sheets for C500-NC222-E

Positioning Action (X-axis: 100 to 399, Y-axis: 500 to 799)

Address			Field	Setting range	Data
		0	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes 0: no	
			Interpolation positioning action type	1: circular arc 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	
		1	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	

Address			Field	Setting range	Data
		2	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	
		3	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	
		4	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	

Address			Field	Setting range	Data
		5	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	
		6	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	
		7	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	

Address			Field	Setting range	Data
		8	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	
		9	Position	0 to 99,999,999 pulses	
				0 to 99,999.000 mm	
				0 to 9,999.0000 inches	
			Speed	0 to 99	
			M code	0 to 99	
			Dwell time	0 to 9	
			Acceleration and deceleration time	0 to 9	
			Positioning action type	ABS, INC	
			Interpolation positioning action	1: yes; 0: no	
			Interpolation positioning action type	1: circular arc; 0: end point	
			Circular arc data type	1: circular arc center 0: intermediate point	
			Circular arc direction	1: CCW; 0: CW	
			Completion code	1: continuous; 0: terminating	
			Positioning action enable/disable	1: enable; 0: disable	
			Synchronization start	1: enable; 0: disable	

Parameter Data (X-axis: 400 to 420, Y-axis: 800 to 820)

Item	Address	Field		Setting range	Data
X-axis parameter data	400	Unit		Pulse, mm, inch	
	401	Pulse rate		0.0001 to 1.0	
	402	Rotation direction		1: – ;0: +	
	403	Encoder type	Z phase	+, –	
			Multiplication	x1, x2, x4	
			A- and B-phases polarity change	+, –	
	404	Gain		(1 to 999) x 10^{-2} x 305 μV/ms	
	405	In-position zone		1 to 999 pulses	
	406	Backlash compensation		0 to 9,999 pulses	
	407	Stroke limit (+)		0 to 99,999,999 pulses	
				0.000 to 99,999.00 mm	
				0.0000 to 9,999.0000 inches	
	408	Stroke limit (–)		0 to 99,999,999 pulses	
				0.000 to 99,999.00 mm	
				0.0000 to 9,999.0000 inches	
	409	Zone setting		0 to 9,999 pulses	
	410	Home shift		0 to ±999,999 pulses	
				0 to ±99,999.0 mm	
				0 to ±9,999.00 inches	
	411	Maximum speed		1 to 300,000 pps	
				0.001 to 9,999.000 mm/s	
				0.0001 to 999.0000 inch/s	
		Teaching Box speed coefficient		1 to 9	
	412	Teaching Box jogging speed		1 to 300,000 pps	
				0.001 to 9,999.000 mm/s	
				0.0001 to 999.0000 inch/s	
		Teaching Box jogging acceleration and deceleration time		0 to 9	
		Number of Teaching Box pulses		1 to 9	
	413	Origin search direction		1: – ;0: +	
	414	Origin compensation		0 to ±999,999 pulses	
				0 to ±99,999.0 mm	
				0 to ±9,999.00 inches	
	415	High origin search speed		1 to 300,000 pps	
				0.001 to 9,999.000 mm/s	
				0.0001 to 999.0000 inch/s	
	416	Origin search acceleration and deceleration		0 to 9	
	417	Low origin search speed		1 to 10,000 pps	
				0.001 to 9,999.000 mm/s	
				0.0001 to 999.0000 inch/s	

Item	Address	Field			Setting range	Data
X-axis parameter data	418	External deceleration-stop pattern			0 to 9	
		Number of deceleration-stop pulses			1 to 10,000 pulses	
					0.001 to 9,999.000 mm	
					0.0001 to 999.0000 inches	
		Deceleration key deceleration pattern			0 to 9	
	419	Disconnection check			1: yes; 0: no	
		Check time			0 to 99	
		Number of check pulses			0 to 999 pulses	
	420	Error counter capacity			10 to 32,768 pulses	
		External output 1 designation			1: ON; 0: OFF	
		External output 2 designation			1: ON; 0: OFF	
Y-axis parameter data	800	Unit			Pulse, mm, inch	
	801	Pulse rate			0.0001 to 1.0	
	802	Rotation direction			1: −; 0: +	
	803	Encoder type	Z phase		+, −	
			Multiplication		x1, x2, x4	
			A- and B-phases polarity change		+, −	
	804	Gain			(1 to 999) x 10^{-2} x 305 μV/ms	
	805	In-position zone			1 to 999 pulses	
	806	Backlash compensation			0 to 9,999 pulses	
	807	Stroke limit (+)			0 to 99,999,999 pulses	
					0.000 to 99,999.00 mm	
					0.0000 to 9,999.0000 inches	
	808	Stroke limit (−)			0 to 99,999,999 pulses	
					0.000 to 99,999.00 mm	
					0.0000 to 9,999.0000 inches	
	809	Zone setting			0 to 9,999 pulses	
	810	Home shift			0 to ±999,999 pulses	
					0 to ±99,999.0 mm	
					0 to ±9,999.00 inches	
	811	Maximum speed			1 to 300,000 pps	
					0.001 to 9,999.000 mm/s	
					0.0001 to 999.0000 inch/s	
		Teaching Box speed coefficient			1 to 9	
	812	Teaching Box jogging speed			1 to 300,000 pps	
					0.001 to 9,999.000 mm/s	
					0.0001 to 999.0000 inch/s	
		Teaching Box jogging acceleration and deceleration time			0 to 9	
		Number of Teaching Box pulses			1 to 9	
	813	Origin search direction			1:−; 0: +	
	814	Origin compensation			0 to ±999,999 pulses	
					0 to ±99,999.0 mm	
					0 to ±9,999.00 inches	

Item	Address	Field	Setting range	Data
Y-axis parameter data	815	High origin search speed	1 to 300,000 pps	
			0.001 to 9,999.000 mm/s	
			0.0001 to 999.0000 inch/s	
	816	Origin search acceleration and deceleration	0 to 9	
	817	Low origin search speed	1 to 10,000 pps	
			0.001 to 9,999.000 mm/s	
			0.0001 to 999.0000 inch/s	
	818	External deceleration-stop pattern	0 to 9	
		Number of deceleration-stop pulses	1 to 10,000 pulses	
			0.001 to 9,999.000 mm	
			0.0001 to 999.0000 inches	
		Deceleration key deceleration pattern	0 to 9	
	819	Disconnection check	1: yes; 0: no	
		Check time	0 to 99	
		Number of check pulses	0 to 999 pulses	
	820	Error counter capacity	10 to 32,768 pulses	
		External output 1 designation	1: ON; 0: OFF	
		External output 2 designation	1: ON; 0: OFF	

Synchronization Positioning Action
(X-axis: 470 to 479, Y-axis: 870 to 879)

Address	Field	Setting range	Data
	Synchronization position	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Other axis address	X axis: 100 to 399	
		Y axis: 500 to 799	
	Synchronization pattern	1: continuous 0: independent	
	Continuous pattern next address	0 to 9	
	Data type	ABS, INC	
	Data enable/disable	1: enable; 0: disable	
	Synchronization position	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Other axis address	X axis: 100 to 399	
		Y axis: 500 to 799	
	Synchronization pattern	1: continuous 0: independent	
	Continuous pattern next address	0 to 9	
	Data type	ABS, INC	
	Data enable/disable	1: enable; 0: disable	

Address	Field	Setting range	Data
	Synchronization position	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Other axis address	X axis: 100 to 399	
		Y axis: 500 to 799	
	Synchronization pattern	1: continuous 0: independent	
	Continuous pattern next address	0 to 9	
	Data type	ABS, INC	
	Data enable/disable	1: enable; 0: disable	
	Synchronization position	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Other axis address	X axis: 100 to 399	
		Y axis: 500 to 799	
	Synchronization pattern	1: continuous 0: independent	
	Continuous pattern next address	0 to 9	
	Data type	ABS, INC	
	Data enable/disable	1: enable; 0: disable	
	Synchronization position	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Other axis address	X axis: 100 to 399	
		Y axis: 500 to 799	
	Synchronization pattern	1: continuous 0: independent	
	Continuous pattern next address	0 to 9	
	Data type	ABS, INC	
	Data enable/disable	1: enable; 0: disable	

Zone Setting Data (X-axis: 480 to 487, Y-axis: 880 to 887)

Address	Field	Setting range	Data
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	

Address	Field	Setting range	Data
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	

Address	Field	Setting range	Data
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	
	Zone ON data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	Zone OFF data	0 to ±99,999,999 pulses	
		0 to ±99,999.000 mm	
		0 to ±9,999.0000 inches	
	External output ON/OFF	1: yes; 0: no	
	External output designation OUT1	1: designated 0: not designated	
	External output designation OUT2	1: designated 0: not designated	
	Data enable/disable	1: enable; 0: disable	

120

Dwell Times (X-axis: 450 to 459, Y-axis: 850 to 859)

Address	Field	Data (0 to 9,990 ms)
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		

Acceleration and Deceleration Times
(X-axis: 460 to 469, Y-axis: 860 to 869)

Address	Field	Data (0 to 9,990 ms)
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		

Speed (900 to 999)
(1 to 300,000 PPS, 0.001 to 9,999.0 MPS, 0.0001 to 999.0 IPS)

Address	Field	Data
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		

Appendix E
Coding Sheets for 3G2A5-NC111-EV1

BK	SQ	Pat-tern	ABS/INC	Direc-tion (+/−)	Posi-tion	Speed
0	00					
0	01					
0	02					
0	03					
0	04					
0	05					
0	06					
0	07					
0	08					
0	09					
0	10					
0	11					
0	12					
0	13					
0	14					
0	15					
0	16					
0	17					
0	18					
0	19					
0	20					
0	21					
0	22					
0	23					
0	24					
0	25					
0	26					
0	27					
0	28					
0	29					
0	30					
0	31					
0	32					
0	33					
0	34					
0	35					
0	36					
0	37					
0	38					
0	39					

BK	SQ	Pat-tern	ABS/INC	Direc-tion (+/−)	Posi-tion	Speed
0	40					
0	41					
0	42					
0	43					
0	44					
0	45					
0	46					
0	47					
0	48					
0	49					
0	50					
0	51					
0	52					
0	53					
0	54					
0	55					
0	56					
0	57					
0	58					
0	59					
0	60					
0	61					
0	62					
0	63					
0	64					
0	65					
0	66					
0	67					
0	68					
0	69					
0	70					
0	71					
0	72					
0	73					
0	74					
0	75					
0	76					
0	77					
0	78					
0	79					

BK	SQ	Pat-tern	ABS/INC	Direc-tion (+/−)	Posi-tion	Speed
0	80					
0	81					
0	82					
0	83					
0	84					
0	85					
0	86					
0	87					
0	88					
0	89					
0	90					
0	91					
0	92					
0	93					
0	94					
0	95					
0	96					
0	97					
0	98					
0	99					
1	00					
1	01					
1	02					
1	03					
1	04					
1	05					
1	06					
1	07					
1	08					
1	09					
1	10					
1	11					
1	12					
1	13					
1	14					
1	15					
1	16					
1	17					
1	18					
1	19					
1	20					
1	21					
1	22					
1	23					
1	24					
1	25					
1	26					

BK	SQ	Pat-tern	ABS/INC	Direc-tion (+/−)	Posi-tion	Speed
1	27					
1	28					
1	29					
1	30					
1	31					
1	32					
1	33					
1	34					
1	35					
1	36					
1	37					
1	38					
1	39					
1	40					
1	41					
1	42					
1	43					
1	44					
1	45					
1	46					
1	47					
1	48					
1	49					
1	50					
1	51					
1	52					
1	53					
1	54					
1	55					
1	56					
1	57					
1	58					
1	59					
1	60					
1	61					
1	62					
1	63					
1	64					
1	65					
1	66					
1	67					
1	68					
1	69					
1	70					
1	71					
1	72					
1	73					

BK	SQ	Pat-tern	ABS/INC	Direc-tion (+/−)	Posi-tion	Speed
1	74					
1	75					
1	76					
1	77					
1	78					
1	79					
1	80					
1	81					
1	82					
1	83					
1	84					
1	85					
1	86					

BK	SQ	Pat-tern	ABS/INC	Direc-tion (+/−)	Posi-tion	Speed
1	87					
1	88					
1	89					
1	90					
1	91					
1	92					
1	93					
1	94					
1	95					
1	96					
1	97					
1	98					
1	99					

Parameters

No.	Item	Permitted Settings	Data
0	Unit	mm: 1; inch: 2; deg: 3; pulse: 4	
1	Pulse rate	0.0001 to 1	
2	CW limit	0 to 999,999 (pulse)	
3	CCW limit	0 to 999,999 (pulse)	
4	Backlash correction	0 to 9,999 (pulse)	
5	Maximum speed	1 to 1,000,000	
6	Initial speed	1 to 1,500	
7	Acceleration/Deceleration time	0.1 to 9.9	
8	Constant speed pulses	0 to 255	
9	Dwell time	0 to 99.99	
10	Search pattern and origin search direction	Search pattern 0 to 5 Search direction CCW: 1; CW: 0	
11	Origin compensation	±0 to 9,999	

Speeds

No.	Item	Speed data
	Speed (numeric)	1 to 100,000 pulse/s
✻0	Origin return	
✻1	Origin search	
✻2	Manual speed	
✻3		
✻4		
✻5		
✻6		
✻7		
✻8		
✻9		

Index

Numbers

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Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. W321-E1-1

⎿⎯ Revision code

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	June 1997	Original production